Green Pedagogy

From theoretical basics to practical sustainable learning activities.

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Theoretical Constitution of Green Pedagogy

Christine Wogowitsch

> The call for a sustainably effective and comprehensive education grows.

An increasingly complex world presents people with great challenges in making everyday choices while considering ecological, economic, and social aspects as well as being able to assess the extent of relevant impacts. The call for a sustainably effective and comprehensive education grows especially loud when global markets react unpredictably due to political or climatic crises. Historical developments suggest that political or religious ideologization has always been closely connected to a change of the learning culture.

Current processes of globalization, specialization and differentiation, the general rise in formal education and the discernable limits to state control make a change in the learning culture necessary (cf. Schmidt, 2005, S. 23).

Literature

Schmidt, S. (2005): Lernen, Wissen, Kompetenz, Kultur. Vorschläge zur Bestimmung von vier Unbekannten. Heidelberg: Verlag Carl Auer.
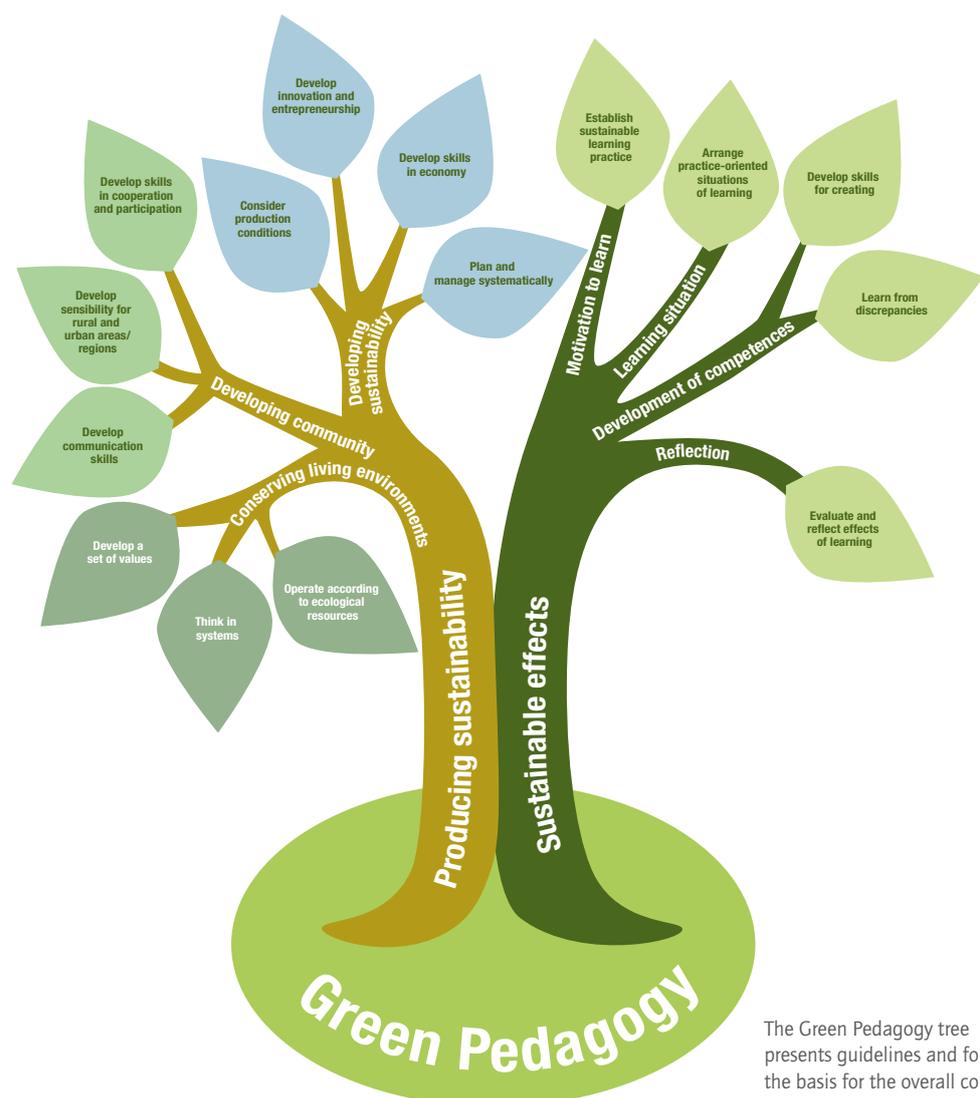
The Green Pedagogy tree presents guidelines and forms the basis for the overall concept.

Conceptualization of Green Pedagogy

Why Green Pedagogy at the University College for Agrarian and Environmental Pedagogy?

Angela Forstner-Ebhart

The University College for Agrarian and Environmental Pedagogy provides unique conditions to integrate individual experiences and concepts in ecological and economic fields of learning into lasting learning processes.

Pedagogical concepts and methods can be developed in the fields of agriculture, home economics and business administration as well as consumption-oriented topics and regional development that are suitable for fostering system competency and guiding learning processes. System competency (see also theoretical findings) not only requires situation and domain specific knowledge and action, but also an understanding of the cause-effect structure of complex dynamic systems. Additionally, stakeholders in future areas of activity will require self-reflection in their intervention in complex systems.

The constitution of Green Pedagogy aims to illustrate the didactic principles of the University College for Agrarian and Environmental Pedagogy. The theoretical foundation of a Green Pedagogy is essential for a systemic cross-linkage of the fields of study of Agrarian and Environmental Pedagogy as well as a method-oriented implementation in the design of learning activity plans in practice.

The pilot project Green Care by the Viennese Chamber of Agriculture is implemented at the University College for Agrarian and Environmental Pedagogy; therapeutic-pedagogic services for children or adults with special needs are offered in the context of animal and plant assisted learning activity plans. Here, particularly the social aspects of Green Pedagogy should become clear with lasting effect.

The concept of sustainability in Green Pedagogy

The outwardly seemingly ambivalent fields of study of Agrarian and Environmental Pedagogy have a common denominator: sustainability. Educational processes that aim to satisfy the ambiguous concept of

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sustainability must display "long-lasting effects" and must in correspondence with the ecological principle of forestry be characterised by "continual use" (cf. Drosdowski, 1994, p. 23–38). As an attribute for education therefore "sustainability" means that education has a long-lasting effect and is in continual use. These criteria also hold true for the future design of learning situations he realms of practice.

Green Pedagogy is separate from Education for Sustainable Development (ESD) in that ESD does not represent an educational concept derived from pedagogical theories or contains its own catalogue of educational goals, educational content, spheres of knowledge and topics taught. Riquarts und Saez (2004) describe ESD as a concept that emerged from an (international) development of the political will. Rost (2002) understands ESD as a form of assignment by political authorities to educators and educational theorists to draw up an educational concept that meets the requirements of the sustainable development of our world. Green Pedagogy at the University College for Agrarian and Environmental Pedagogy tries to carry out this assignment, however using a didactic theory in accordance with Peterßen (2001, p. 146), which provides information on didactic action and thus also fulfils a pragmatic function. Moreover, Green Pedagogy needs to give guidance that can serve to legitimate didactic action. A description of Green Pedagogy also needs to mention the paradigmatic structure of the didactic requirements in the sense of specific ways of thinking and looking at things.

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THEORY

„Sustainable" education should be examined with regard to a successful transfer of learning (cf. Weinert 1996, 1997) from the point of view of the learner and is only fulfilled when learners are able to apply knowledge in variable situations.

Neurobiolgcial findings (according to Birbaumer, 2003) explain sustainable learning through neural facilitation owing to successful consolidation of neuronal networks to accelerate associative and deductive thinking.

The focus of sustainable education must be put on life-long learning because continued education is aimed to be secured by fostering the willingness to learn and sharpening the view of complex problem solving from multiple perspectives. Thus, fostering the motivation to learn is a focal point of Green Pedagogy. The readiness and ability "to learn one's whole life, acquire new competencies, also to reconsider and revise convictions" (Achtenhagen, Lempert, 2000, p. 7) must be developed. In the context of "sustainable" education, this fostering of the reflective dimension aims to help the application or supplementation of knowledge learned and the questioning of subjective patterns of interpretation and emotion (according to Arnold, 2007) from multiple perspectives.

The central themes of Green Pedagogy refer to the multiplicity of objectives at the university and mirror the high expectation for development, which is to be realized within the frame of Green Pedagogy.

The aim is to empower students to contribute to the advantageous development of agriculture and resource use as well as an altogether sustainable development in their classes and in consultation. Students use relevant expert knowledge to understand the fundamentals of agriculture, the environment and sustainable development. In this context, they learn to

Principles of Green Pedagogy
(according to the concept paper of the university didactics 2010)

The orchestration of sustainable educational processes, which broach ecological, economic and social problem areas and accompany learners in the individual phases of development by mentoring and coaching are the focus of Green Pedagogy.

The following principles of university didactics characterize Green Pedagogy:
– an interdisciplinary approach to pedagogic content
– a multi-perspective examination of ecological and economic topics
– a specific coupling of expert knowledge for sustainable and economically meaningful development with pedagogic-didactic knowledge
– process-oriented strategies for the future and problem solutions
– cultural sensitivity, value orientation and development of emotions
– methodological variety for the promotion of autonomy, participation, joint responsibility
– a holistic reference to practice, life, space, nature and culture
– the coupling of disciplinary and pedagogic knowledge with practice
– a metacognitive handling of openness and contradictions

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express themselves clearly and correctly (including in discourse) and to understand important subject matters from different perspectives. Students should see nature and cultural areas as well as the occupational groups acting within them as partners and develop a willingness to lead by example.

The development of Green Pedagogy is focused on initiating learning processes which allow students to learn to find or contribute to sustainable solutions for the tensions created in the protection and use of nature as well as point out potential problems arising from the interconnectedness of man, nature and technology. To foster sensitivity for life and economy in rural and urban spaces, Green Pedagogy learning activity plans will include systematic critical analysis. Reflecting on contradictory situations as well as practicing to position oneself and to act in a solution-oriented manner would allow students to advocate for values conducive to sustainable development in the setting of agricultural holdings and organisations in education and consulting.

The use of creative methods to develop visions aims at finding new, meaningful and surprising solutions to questions concerning sustainable development in the context of entrepreneurial action as part of lectures and seminars. In teaching-learning settings students will work to question their own images, attitudes and behavioural patterns. They should develop concepts to newly link what is well-established and/or combine that with new aspects. This should allow them to successfully position themselves in open and contradictory situations and engage in authentic action.

Students learn to plan and shape teaching and consulting situations that motivate and support future learners/customers to contribute to sustainable development and take up a social, ecological and economic perspective of the value-added processes of a single business or a region. Entrepreneurial qualities such as creativity, personal responsibility and decision making will be fostered in order to serve economic and ecological dynamics as well as social balance. This social sustainability aims to enable the participation of all members of a community in order to ensure the sustainability of society itself.

Green Pedagogy is implemented through educational processes which foster sustainable development. Education in this context is not simply a means to an end, but aims at building system competency for pedagogic and consultative practice and thus a successful life.

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Theoretical pillars of Green Pedagogy
On acting in complex systems – the focus of Green Pedagogy

Foerster (1993) criticised the constant attempt of scientific reduction of complexity through linear, causal thinking which fails to consider the interconnectedness of reality, interdependency and consequence. Social sciences, as described by Foerster, are "soft sciences" confronted with "hard problems"; interdisciplinary problems and mediation with people is at the centre rather than "nature" and isolated facts.
Kriz (cf. 2000, p. 10) also points out the increasing physical and psychological overtaxing of active human beings in our increasingly complex world. Humans, according to Kriz (ibid.), have not learned to think systemically, although they inhabit living environments that are part of different systems. The consequences are errors and failure in the design of living spaces.

Action in complex social systems thus requires comprehensive competency to shape the future (Haan, Harenberg 2008), which does not only consist of domain-specific specialised knowledge, but allows the expression of varied dimensions of knowledge in actions and thus to successfully interact in dynamic social systems.

Building competency to shape the future through knowledge as a resource

Knowledge as a resource for the ability to act in complex systems has to correspond to the criteria of intelligent knowledge (Weinert 1996, 1997), which is built vertically (on prior knowledge) and horizontally (interdisciplinarily and situationally) to be available in a system-oriented and interconnectable way. According to Schrader (2003) knowledge as a resource is connoted in its various dimensions: practical knowledge (facts, techniques, competencies), interactive knowledge (understanding, reflection, analysis), identity knowledge (self-organisation, self-perception) and orientation knowledge (value orientation), and should be supplemented multi-dimensionally in ambitious teaching-learning settings.

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Moreover, Rost (2009) states that whether the different forms of representation of the resource "knowledge" are given space is key to the expansion of knowledge. Knowledge should not only be used in symbolic (linguistically, in writing) but also iconic (pictorially, graphically) and enactive (action-oriented) forms of representation. Knowledge management should be at the heart of a learning organisation, because actions that require decisions draw on knowledge resources. For an orientation and action guiding function of knowledge, that should be called for in Green Pedagogy, the significance of metacognition must be particularly emphasised. Hasselhorn (in Rost, 2006) refers to metacognition as the systemic knowledge domain, which does not only comprise knowledge about functional regularities but also influencing factors of one's knowledge and thus helps to analyse strengths and weaknesses of one's resource "knowledge"

Metacognitive processes consist of grasping the demands of a problem, constructing a solution plan, choosing an appropriate solution strategy, monitoring while successively coming closer to the goal and possibly modifying the solution plan. The prospect of successful action according to Gerstenmair, Mandl (2000) is often a decisive motivation for knowledge acquisition and the action itself also produces further knowledge.

System competency as a foundation of competency to shape the future in line with Green Pedagogy

Using the construct of competency to shape the future, Haan, Harenberg (2008) describe an inclusive process of education for sustainable development and the learning about sustainable development. From analyses of the present time and studies about the future of ecological, economic and social developments, hypothetical syntheses should be derived, which consider an interdependence of different systems. Based on that, decisions should be understood, made and implemented in order to realise sustainable development processes.

Competency to shape the future requires interpretation abilities and didactic as well as educative imagination (cf. Arnold, 2007, p. 153), which should be prepared for and developed in a permanent cycle of putting theory and practice into relation to each other. In different experiences and situations knowledge concepts must be enriched to be available in new contexts and be adaptable if necessary.

It is therefore not enough to equate the learning objective of an education with knowledge about systems or defining it via the ability to control or regulate systems, but also the awareness for the interdependency between systems and the translation into corresponding action.

Green Pedagogy, committed to sustainable education, understands system competency as a stable and flexible quality that also enables learners to deal with complex situations in the future. The holistic perspective of systems theory according to Luhmann (1984), which perceives all societal phenomena as a system and describes its functioning through existing interdependencies, is therefore significant for an innovative education at the University College for Agrarian and Environmental Pedagogy.

According to Ossimitz (1995) temporal dimensions need to be considered as systems possess a certain momentum or temporal behavioural characteristics (such as time delays or oscillations) that need to be taken into account for successful system control. Systems' momentum of their own can be determined by system-internal feedback that leads to escalating growth or also oscillations. "A purely retrospective-chronistic detection of past developments is not enough – even though one can learn things from these developments about the future. Systemic thinking should also enable to foresee future system developments and to plan and implement adequate control measures" (Ossimitz, 1995). Students at the University College for Agrarian and Environmental Pedagogy as future actors in ecological, economic and social fields will be confronted with many interacting components which do not follow a linear cause-effect principle but require principles of systemic thinking to take into account non-linear dynamics.

Social systems, according to Luhmann, function like organisms whose cell systems are interdependent and thus create a new complexity. Suddenly emerging consequences may occur and represent a qualitative change that is reflected in the specific performance of society (cf. Becker, Reinhardt-Becker, 2001, p. 27f.).

"Systems theory is therefore a multi-disciplinary approach with the goal of integrative cooperation between different scientific fields" (Kriz, 2000, p.17). The system-theoretical approach is one of the science-theoretical pillars for the foundation of Green Pedagogy because only a holistic but also analytical perspective of ecological, economic and social aspects corresponds to this dynamic cause-effect structure. Ecology, economics and social developments are system-theoretically subject to a structural coupling, because "structural coupling exists, where systems provide themselves with complexity – be it mutual or one-sided" (Becker, Reinhardt-Becker, 2001, p. 65).

Systems "as processes remain stable in a certain time or change, and it is exactly these development processes that are focused on" (Kriz, 2000, p. 22). For the observation the processual nature and goal-orientation of systems, a view from the meta level (a second-order observation) is necessary because in systems only what may be assigned to the respective horizon of meaning can be perceived and the system is unaware of the blind spots of its perception (cf. Becker, Reinhardt-Becker 2001, p. 68).

Due to the resident systems of Agrarian and Environmental Pedagogy at the University College for Agrarian and Environmental Pedagogy, second-order observations of the mutual analysis of strengths and weaknesses can lead to further development. Further development includes also an openness across system boundaries, characterised by exchange and interaction processes with the environment and thus makes feedback possible which ensures change but also stability.

System competency in social constructivist concepts of Green Pedagogy

Future pedagogic concepts will require the clarification of complex connections, which inductively and in a bottom-up understanding exemplarily represent systems as part of a larger order or reduce "a whole" deductively from a top-down perspective into subsystems. In every case, the cross-linking of systems for learners in the learning process must become apparent to meet the dynamic requirements of systems theory. How well synergies of the particular systems of Agrarian and Environmental Pedagogy may be used is contingent upon the construct of system-competent capabilities. According to Schiepek et al. (1993), this becomes evident with regard to the ability and willingness to recognise the affiliation of singular phenomena to a larger system, sensitively form system boundaries, understand systems' functioning and cre-

> The system-theoretical foundation of Green Pedagogy is a holistic but also analytical perspective of the ecological, economic and social domains.

ating prognoses about further developments based on changed components of a system. Schiepek (1997, p. 190f.; in: Kriz, 2000, p. 12f.) formulated the following selection of partial qualifications:
– consideration of social structures and contexts: clarifying expectations, giving feedback, drawing up presentations
– handling of the temporal dimension: perceiving sensitive moments, accepting limits to forecasting and non-linearity, developing predictions
– dealing with emotional dimensions: coping strategies, tolerance of ambiguity in relation to contradiction
– social contract abilities: ability to deal with conflict and willingness to cooperate
– development of self-organisation conditions: tolerance culture, eagerness to experiment
– the use of systems-theoretical methods and theoretical knowledge: reduction of complexity and scientific modelling

From a systemic-constructivist perspective (cf. Reich, 2005) "everyday reality" is a complex network of individually and socially constructed realities. "Knowledge cannot be transferred, it must be created anew in the brain of every learner" (Roth, 2003, p. 20), learning processes are therefore qualitatively marked by the autonomy, activity and self-organisation of learners. Appropriate learning activity plans that are conducive to the acquisition of system competency have to deal with complex problems which meet the demands of rural and regional living environments and can actively be worked on by learners in various methodological settings to realise pedagogic or consultative goals.

The appropriate selection of problems should be seen as key to the achievement of goals. With the help of adequate problems, Rogers' (1976) requirements of learning concepts may be met, because the active overcoming of problems requires personal commit-

ment, self-evaluation and a holistic approach. According to Kolb (1984), learning is a continuous process in which experiences are collected in concrete or abstract form and are then used in preferred learning styles in experimental or reflective ways. In the framework of "Experiential Learning" (cf. Kolb 1984), application in the form of action and testing of plans and the experiences thus made possible allow for a reflected evaluation and generalisation of findings.

Due to subjective structure dispositions, learners deal with contents in individual ways depending on their current mental state (postulated Emotional Learning according to Arnold, 2005) and on the interpretation based on existing convictions. In this case, the individual does not organise and construct their knowledge by the criterion of establishing the truth, but the principle of viability, that is to say how fitting and viable, action informed by that knowledge proves to be (cf. v. Glasersfeld, 1996, S. 121 f.). For teaching-learning settings of Green Pedagogy this means that learning contents need to be viable for learners, to be accepted and have a long-term effect. Learning processes are shaped by an individual construction process in which learners create their own subjective image of the content, while the quality of this construction is shaped by the social and situational framework of the teaching-learning setting because social realities are characterised by various contexts.

The model of "situated cognition" (cf. Lave, Wenger, 1991) illuminates that knowledge gain is embedded in a social, cultural and historic context and cognitive concepts are constructed together in culturally organised contexts and built up with others in a society as "shared cognition" (Reinmann-Rothmeier, Mandl, 1997, p. 368). The construction of reality thus also

takes place through social processes and the effects of situative and social frameworks need to be considered as essential in the design of learning activity plans if systemic competencies should be attained, meta communication and reflexion about constructed realities need to happen, according to Wygotski (1964), experiences in the framework of enculturation for the development of concepts of everyday life. In this concrete "world of experiences" concepts of everyday life are constructed and are not integrated in a scientifically coherent system, but arose situationally.

When subjective findings arise in active interaction, a consequence may be tolerance of alternative views of reality, provided that through reflective techniques a change of perspective was made possible, which help to explain specific systemic behaviour. Interdisciplinarity and pluralism of methods in Green Pedagogy at the University College for Agrarian and Environmental Pedagogy aim to ensure a diversity of perspectives, because "only through interdisciplinary creation of a variety of perspectives can complex systems be better reconstructed in their holistic and interlinked nature" (Kriz, 2000, p. 66). A balance between systems of ecology and economics should arise in the social interaction with each other.

Researching learning concepts in the spirit of "Green Pedagogy"

Sustainable learning in the sense of "Experiential Learning" following Kolb (1984) is also coupled with learners' capacity to be irritated and to reflect because "learning happens when differences are perceived" (Siebert, 1997, p. 292). "The particular strength of institutional learning is not found in the exhaustive imparting of knowledge and experiences of every kind but in providing an impulse for the new and unfamiliar" (Schäffter, 2001, S. 174).

The term "conceptual change", understood as an implicit conceptual process of change, was coined in the didactic discussion about natural science education in the Anglo-American world. "Individuals often acquired knowledge about an issue that later-on proves to be not adequate any longer. In such cases relearning is required which aims to change existing knowledge" (Schnotz, 2001, p. 77).
Learning is an inquiring process because learners constantly check the provability of knowledge (Posner et al., 1982, p. 212). Piaget (1969) postulates using cognitive science that the reorganisation of knowledge is marked by the confrontation between a general tendency to equilibrate, i.e. the search for balance, and irritating stimuli of the environment. The cognitive

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system thus strives for equilibrium, reaction to cognitive conflicts is therefore generally either assimilating or accommodating which can differently affect the individual cognitive structure. In the process of assimilation learners use existing concepts to subjectively deal adequately with new phenomena. The process of accommodation refers to a situation where learners are unable to categorise new phenomena into existing patterns and are prepared to reorganise or add to existing concepts.

Inquiry-based learning includes potential resistance against existing concepts because the inquiry-based learning process can lead to perturbations. When learners are confronted with environmental stimuli, they put them in relation to available rational concepts. This starts a cognitive constructing process of organisation and of checking how the irritating moment is to be categorised. Sustainable learning should be understood as a conceptual process of change and happens primarily due to accommodation.

The change of existing concepts requires several prerequisites: there must be discontent with existing concepts, which requires multiple unsolved problems which cannot be solved with existing concepts of knowledge. A new concept must be comprehensible, the means for restructuring of experiences must seem plausible and compatible with other knowledge.

The conceptual system change of a person can happen gradually or step-by-step during the learning process. As a typical aspect of the accommodation process, just some seemingly new phenomena are accepted, and the ideas of the new conception are only taken on and modified in further steps. Every new adaptation of a concept leads to a substantial reorganisation or change of cognitive representation. The accommodation process can rarely be characterised as something like a flash of insight, but this change of existing concepts is rather marked by tentative feelings, false starts and frequent changes of direction (cf. Posner et al. 1982, p. 223).

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Opportunities for development in autonomous learning processes

Learning is an active, self-directed, constructive, situational and social process (cf. Reinmann-Rothmeier, Mandl, 1997, p. 356), which therefore always requires the learners' active involvement. Knowledge acquisition in this case is seen as a mostly self-organised process of acquisition by the learners that to a large extent happens systemically and situationally and is ultimately controlled by learners' prior cognitive knowledge, principles of processing, motivations and emotions.

According to Siebert (2009) learning processes need to importantly take into account learners' self-organisation, as learners decide which contents are meaningful, whether uncertainties exist or if further steps of learning are required and thus teaching and learning needs to be regarded from the point of view of the theory of self-determination.

In findings of the theories of self-perception and cognitive evaluation following Deci and Ryan (1985; in: Herkner, 2004), two components for intrinsic motivation are being postulated: the need for self-determination and the need to perceive oneself as competent. Expansive learning refers to a form of self-determined or autonomous learning where the subject is motivated internally to expand their ability to act through learning because learning is integrated into everyday practice. Thus learning can happen autonomously and without pressure from the outside; people act self-determinedly and experience themselves as able to control their behaviour. Autonomous learning processes make transformative learning for personal development possible by allowing personal and social changes to happen.

On the didactic macro-structuring of teaching-learning settings in Green Pedagogy

Teacher-centred instruction is mostly centred around passive knowledge transfer, which according to neurobiological research (e.g. Birbaumer, Schmidt, 2003; Herrmann, 2006; Hüther, 2006; Roth, 2011; Spitzer, 2006) ignores the emotional involvement of learners and the respective subjective structure formation. For teaching by asking questions, Wahl (2006) coined the term "Osterhasenpädagogik" ("Easter bunny pedagogies") because it often only aims to enable learners to correctly answer teachers' question and thus only strengthens inert knowledge which cannot be used in varied contexts. According to the findings referred to above, system-competent capabilities cannot be acquired in a traditional manner.

For the acquisition of systemic capabilities, Green Pedagogy follows the requirements of enabling or empowering didactics ("Ermöglichungsdidaktik"; i.e. "didactics of enabling", Arnold, Schüßler, 2003) which is based on system-theoretical and constructivist findings and tries to "conceptualise the didactic events from the logic of acquirement" (Arnold, 2007, p. 54).

When learners are in focus during the conception of teaching-learning settings, the following five aspects need to be considered:
– **Communication** for the accompanying verbalization of learning processes to emphasise the individual construction of knowledge and the description of emotions as well as obstacles in the process of understanding and the reconstruction of knowledge in a group
– **Cooperation for network** use in the sense of reconstructing knowledge and a link to the environment in order to use appropriate synergies
– **Exemplary learning** to work on concrete solutions for problems that fit various contexts, and for stabilisation
– **Opportunities for action and reflection** to internalise and establish responsibility as well as to broaden points of view to gain multi-perspectivity and obtain "cognitive glasses"; this includes the reflecting recognition of divergence in constructions of meaning due to implicit and explicit rules of a social field, which shape the respective habitus (according to Bourdieu, 1976).

> Learning processes are cognitive processes.
>
> Rolf Arnold

Learning processes in the spirit of Green Pedagogy must be organised in a way that enables learners to participate and cooperate in creative and practice-oriented teaching-learning settings. The fostering of learners' achievements and development must be at the heart of the use of didactic principles and serve the construction of different knowledge domains in all forms of representation, which can be used in a system-oriented linking manner (interdisciplinarily) and in decision-making processes.

Interdisciplinarity is necessary to develop multi-perspectivity, stimulate circular reflection processes and implement them in various contexts, therefore illustrating the relativity of knowledge in a constructivist sense. Moreover, reflection causes a verbalisation of the learning process and evidence-based assessment capabilities, explorative data surveying and theory-led interpretation should therefore potentially be applied independently.

The assessment of the impact of education needs to happen in an evaluative and reflective process, since the effects of interventions manifest themselves in their influence on the lasting and transformative development of specialised and content-related, social, methodical and emotional competences (Arnold, 2004; in: Schüßler et al., 2005). Aspects of motivation and volition for ecologically, economically and socially sensible action can only be effective if new points of view are accepted because they are subjectively emotionally tolerable and could be stabilised in various situations due to successful testing.

Competency-based education according to Green Pedagogy

Sustainable education in the framework of Green Pedagogy is oriented towards the definition of competency according to Heyse and Erpenbeck (2008). "Competencies are the complex, partially concealed potentials – and therefore the 'can' and 'could'. They comprise complex experiences and motivations for action that are based on appropriated rules, values and norms of a person or group. As a result, rules, values and norms only become relevant for an individual's action if they have been appropriated, 'internalised' in the form of personal emotions and motivations. 'Merely learned' but not internalised rules, values and norms remain fairly insignificant for one's own actions. The internalised emotions and motivations find their way into one's own experiences." (Heyse, Erpenbeck, 2008, p. XI)

In competency-based and sustainable education processes therefore emotional involvement needs to be experienced in order to internalise rules, norms and values. Sustainability in learning behaviour is reflected in successful self-organisation, lasting self-reflection and a corresponding value orientation to define and realise goals and ethical principles. These capabilities are particularly important in complex system and open problem and decision-making situations. The field of social competencies deserves special attention, since sustainable education processes require the exchange with other learners for the co-construction of experiences which confront individually shaped concepts with unfamiliar points of view.

Development of competency with a view towards performance happens when self-organisation and the ability of self-directed action are seen as goals, which also includes the significance of emotions and "action-based learning, situated learning, subjectifying learning, experiential learning, informal learning, expertise learning are important, necessary, essential terms." (Gruber, Ziegler, 1996; Gruber, 1999; Bauer, 2001; Bauer, Böhle, Munz, 2002; Rauner, 2004; Böhle, 2008; in: Heye, Erpenbeck, 2008, XVIII).

According to Feindt and Meyer (2010), competency-based education should help to cognitively activate prior knowledge, foster the cross-linking of knowledge and take into account individual differences so that learners can grasp the relevance of a problem and the problem become the essential subject of learning.

> Learning processes in the spirit of Green Pedagogy must be organised in a way that enables learners to participate and cooperate in creative and practice-oriented teaching-learning settings.

A point needs to be found in the learning process where learners are aware and accepting of goal setting. A process of acquisition needs to be initiated which enables flexible application in diverse contexts. The co-construction of knowledge should be fostered in mutual exchange to encourage imagining solutions. Learners and teachers should regularly reflect on learning progress in order to develop learning strategies for future tasks. The assessment of the impact of education needs to happen in an evaluative and reflective process, since the effects of interventions manifest themselves in their influence on the lasting and transformative development of specialised and content-related, social, methodical and emotional competences (Arnold, 2004; in: Schüßler et al., 2005).

Formative evaluation that can offer concrete feedback on observed results during the process of appropriation is particularly decisive for the quality of competency-based learning processes in the spirit of Green Pedagogy because this phase allows for controlling and regulating support and fostering. The focus should be put on the further development of performance and not the repetition of knowledge as before.

Cognitively activating teaching fosters strategic and interconnected knowledge by taking three methodical steps (according to Büchter, 2008):
– Initially, structures are understood through exemplary problems
– Definitions are stated more precisely through systematization
– Points of view are collected and exchanged in a process of co-construction newly formed strategies are applied as independently as possible

Exemplary problems from learners' living and future working environment aim to provoke questions, create involvement as well as initiate irritations of previous experiences. The intrinsic need to find solutions for a prob-

lem is heightened when learners seek answers to their own questions. Approaches should be drawn up and put into relation in the process of research and the exchange with others. This allows for systematisation and the formation of rational patterns which help to clarify and justify assumptions in order to become assertions that can be applied to models. Using models, different assertions may be attempted to be used as arguments and questioned in discourse with others. Solutions have to be interpreted from multiple perspectives in order to examine their usability, which enables the development of different concepts for real actions.

" "Hot spots" are chosen as examples to be focused on in individualised learning activity plans.

On the micro-didactic implementation of learning activity plans following the criteria of Green Pedagogy

Current issues with ecological, economic and social problems, so called "hot spots", are chosen exemplarily and focused on in individualised learning activity plans by constructing concrete situations for a systematic examination. Learners get the opportunity to activate their prior knowledge and become aware of their ideas ("Why is this topic relevant to me?", "What knowledge do I already have?"). An inquiring process is initiated and an exchange of points of view takes place in which learners formulate or choose questions they want to get to the bottom of. This also includes a metacognitive process of reflection ("What do you know now, what did you not know before?", "Where will you apply what you have learnt?") as well as an analysis of the learning process ("What has been achieved?", "What was successful?", "What was developed?", "Which goals are subsequently set?").

Guiding questions should help in the design of learning activity plans in the spirit of Green Pedagogy and meet the following systemic-constructivist criteria:

– **subject-related goal creation:**
– Does the presented learning activity plan allow for joint goal creation between teachers and learners, so that learners do not become the objects of learning?
– What opportunities do learners have to formulate questions?
– Which competencies can be gained with this teaching-learning setting? How can learners demonstrate their learning progress (performance)?

– **Relevance and emotional involvement**
– Which prior knowledge can be activated among learners? Does the learning activity plan enable learners to build upon it?
– Is the starting point of the learning activity plan a relevant problem for a controversial ecological, economic, social discussion?
– How can emotional involvement happen within the learning activity plan?

– **Irritation**
– Does the teaching-learning setting deal with irritations (meaning a perturbation to stimulate learning) that, with the help of a change of perspective, lead to solutions/compromise/further developments?
– Which provocative theses can help to critically analyse a system?

– **Exemplarity**
– Does the chosen learning activity plan conform to the rules of didactic reduction for exemplary learning? Are the selection criteria "goal", "time" and "target audience" met?

- **Multi-perspectivity**
- Which suggestions/methods are given/applied in order to break out of linear thinking or thinking routines?
- How can emotions be brought into and considered in the learning process?

- **Co-Construction and social exchange**
- Are learners given the opportunity to construct their own ideas and test their usefulness?
- Which opportunities are learners given to communicate?
- Which occasions are provided to allow learners to exchange ideas?
- What does the support or coaching of teachers look like during the learning process?

- **Modelling**
- Can the methodological application (taken from Green Pedagogy's set of methods) be used to model varied approaches (to illustrate complexity)?
- Which inputs (media, expert interviews, short teacher-centred input) are made available to learners so that subsequent tasks can be accomplished independently?

- **Evaluation and Reflection**
- What does reflection about the personal learning process in the teaching-learning setting look like (metacognition)?
- Which feedback methods can be used to assess formatively and steer the learning process?
- How could the evaluation concerning the achievement of learning objectives take place in a teaching-learning setting?

The realisation of the mentioned didactic principles for Green Pedagogy aims to strengthen the self-efficacy of future actors in pedagogic and consulting activities. Individual thought processes that reflect economic and ecological interdependence should be taught in teaching-learning settings in order to enable the deviation from routine chains of causality and to put new information into context. To understand complex systems, the guidance of learning processes requires the use of models that help with transparency and thus comprehension and critical reflection. Methodological pluralism is necessary for the achievement of the guiding ideas and realisation of the pedagogic principles. In the context of the development of Green Pedagogy, a set of methods and best practices was developed as potential tools for competency-based teaching.

Varied learning situations in the concepts of "anchored instruction", "problem based learning" and "situated learning" are therefore favoured in Green Pedagogy in order to link the knowledge acquisition with application. Other examples from the set of methods used within Green Pedagogy include "future workshops" and "future conferences", problem-oriented tasks on site and on contradicting topics, experience-oriented methods for the experience of nature, role playing and simulation, scenario techniques, student-run businesses, working on case studies, interdisciplinary teamwork as well as the didactic use of new media.

> Methodological pluralism is necessary for the achievement of the guiding ideas and realisation of the pedagogic principles.

The theoretical foundation of "Green Pedagogy"

Angela Forstner-Ebhart & Walter Haselberger

> **99** When, if not now?
> Where, if not here?
> Who, if not us?
>
> J. F. Kennedy

Introduction

The aim of this article article is to illustrate the pedagogical frame of Green Pedagogy. Green Pedagogy aims to illuminate in greater detail in teaching-learning settings the economic, ecological and social aspects – in whose center the action of humans in and with nature is located. The challenges for the cross-linking of these aspects are complex, as the key category is the sustainability of developments. Perspectives for sustainable action and corresponding conclusions are evaluated in contrary ways from different positions.

The postulates of Education for Sustainable Development (ESD) form the basis of Green Pedagogy. These invite a critical examination of ecological, economic and social topics. The pedagogical foundation of Green Pedagogy goes beyond that point. Theoretically founded didactic models are selected for the development of corresponding lesson concepts and an adequate variety of methods is suggested (Wogowitsch, 2013, p. 44f.).

Lesson concepts of Green Pedagogy focus on the clarification of multi-perspectivity for problems. They are characterised by a large degree of participation of learners. Tasks relating to development and sustainability are diverse and need to be assessed anew again and again. Value orientation is thus the foundation of Green Pedagogy. Knowledge and diverse competencies are the basis for defining criteria for an individual evaluation of problems. It is essential to stimulate willingness to learn and to increase awareness for current and future problems. Numerous findings (Arnold, 2012; Siebert, 2009; Reich, 2005; Rogers, 1976) indicate that sustainable learning requires a socially and emotionally involving environment which allows learners to reflect.

Pedagogical objectives of Green Pedagogy

Sustainable education focuses on ecological, economic and social challenges, which need to be actively supported by as many persons as possible in a dynamic society. Sustainable education invites thinking in new directions in order to allow for innovative approaches to solving problems for future challenges. De Haan and Harenberg (1999, S. 60) deem development of competency to shape the future as an objective of sustainable education. These competencies are reflected in "an ability to look ahead in order to modify and model the future of societies in which one lives by active participation in the sense of sustainable development". Democratic participation invites politically mature people to actively act and assume responsibility. The implementation of teaching-learning settings with regard to sustainability implies involving learners intensively and supporting them in getting used to acting actively and assuming responsibility. In the construct of competencies to shape the future, findings by reflection processes have high priority in order to be able to tackle aporias (like helplessness and hopelessness) as well as open solutions. No "recipes for sustainable action"-can be given due to the dynamic nature of processes and unforeseeable developments. Oftentimes decisions lead to dilemma situations. Baacke (2007, S. 52f.) describes the necessary development of "communicative competencies" for situations with open decisions and new challenges. These communicative competencies are characterised by

– the promotion of capabilities to critically assess societal roles (by not sticking to socially defined plans of interaction, but rather reflecting on them),
– the tolerance towards ambiguities (by being able to tolerate different situations),

- the tolerance of ambivalence (by being able to tolerate the ambiguity of situations), and
- the capability for decision-making and acting on one's own responsibility"

In order to live up to the expectations of competencies to shape the future, "communicative competencies" are essential that are characterised by a high degree of reflection, intense dialogue with others, openness and personal responsibility. It is consistent with the didactic principle of Green Pedagogy to evaluate developments in that sense. According to Rost (2002, p. 11) didactic concepts need to be designed such that learners in their lessons are subject to decision-making processes, in which they weigh alternatives against each other and realize their own involved values.

"In doing so it is not the aim for all pupils to reach the same conclusions and especially not necessarily the one reached by their teacher (...). The objective is much rather to connect system relationships and developments with one's own values first and then reach a conclusion regarding the development" (Rost, 2002, S. 11).

Green Pedagogy is competence-oriented and focuses on transfer of learning according to (1996, 1997), that enables learners to use their knowledge in variable situations. The development of competency is based on "life-long learning, always acquiring new competences, questioning and revising beliefs" (Achtenhagen, Lempert, 2007, p. 7). A promotion of life-long learning is only possible if willingness to learn can be initiated and developed. Hence the claim of Green Pedagogy includes that fields of learning are dealt with that possess great relevance for the learners.

Didactic frame of Green Pedagogy

Due to the claims stated above, Green Pedagogy requires a systemic-constructivist implementation, which is based on the stringent cooperation of experts of several disciplines.

An examination of complex, socially relevant topics can only be successful if different perspectives are included. Therefore, interdisciplinarity is a significant factor in the planning of learning activity plans of Green Pedagogy. An added value for learners is created by interconnecting expertise of different disciplines and generating findings from it. The dynamics of societal developments can only be understood through multi-perspectivity. Interdisciplinarity enhances the exchange of teachers and learners. This permits the horizontal integration of knowledge for diverse topics.

Constructivistically oriented approaches in didactics emphasize that "learning is not a consequence of teaching, but an individual constructive performance of the learner" (Jank, Meyer, 2011, p. 286). According to the constructivist concept knowledge can only be acquired based on individual experiences. Learners process content depending on their current mental state (Emotional Learning according to Arnold, 2005) and interpret it based on existing beliefs. In doing so knowledge is organised not owing to the establishment of truth, but according to the principle of viability (usefulness and fit; see Forstner-Ebhart, 2013, p. 27; v. Glasersfeld, 1996, p. 121f.). Learning processes in the sense of Green Pedagogy are geared towards taking into account learners' perspectives. Learners process topics based on social
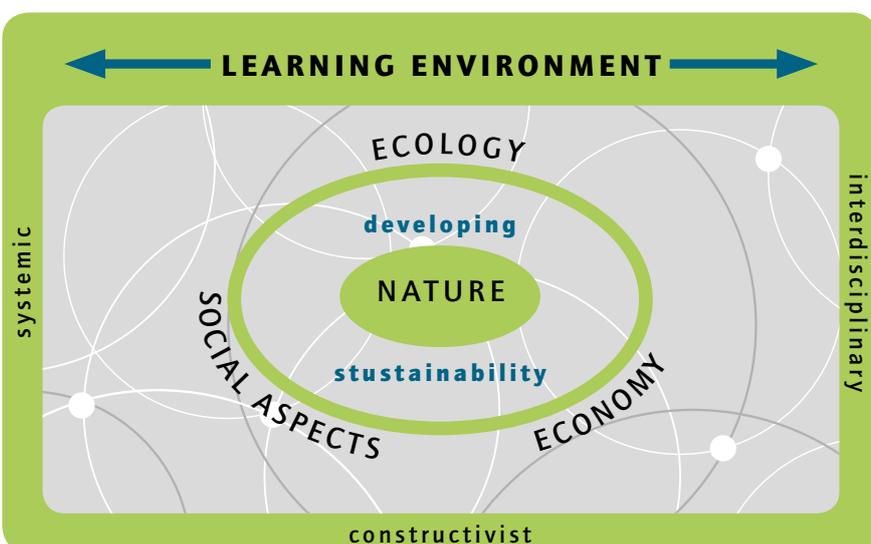
Figure 1: Model of Green Pedagogy

"explosiveness" and attributions of significance. As soon as learners deem contents to be of relevance they will be willing to be involved emotionally as well. Klement (2012, p. 211f.) emphasises the process of acquisition in this respect, which certainly needs to be considered for learning from the perspective of didactic classroom management. In this context constructivist approaches require active, self-guided, situative and social processes, which characterize learning (according to Reinmann-Rothmeier, Mandl, 1997, S. 356).

"Knowledge acquisition is seen as a process of acquirement by the learner that proceeds to a large degree in a self-organised manner, that for the most part occurs systemically and situatively and is in the end controlled by cognitive prior knowledge, principles of processing, motivation and emotions of the learners" (Forstner-Ebhart, 2013, S. 29).

Relevant learning activity plans see learners as "subjects" of their learning process. On the one hand the selection of topics and contents is marked by high topicality and the ability to provoke a societal discourse. On the other hand the selection occurs by a fundamental participation of the learners which "avoids an alienation of their needs, practical know-how and spheres of experiences" (Reich, 2005, p. 268). The participation of learners takes place in three processes according to Reich (2010, p. 45f.):

– the construction (finding a meaning, emotional realization, self-awareness);
– the reconstruction (a collecting and discovering reproduction in the sense of co-construction in order to reach standards based on actions);
– the deconstruction (circularly and systemically scrutinizing the order of things, to uncover and seemingly disorganize them by taking different perspectives).

For topics and content of Green Pedagogy the systemic claim of deconstruction needs to be emphasised especially. Systemic thinking supports the understanding of complexity, intransparency and dynamics (Dörner, 2004 in Frischknecht-Tobler, Kunz, Nagel, 2008, p. 18). Single phenomena need to be understood as elements of a larger system. An awareness of the non-linear dynamics of developments, feedback loops as well as the variation of stability and instability needs to be developed. For this purpose, methods can be employed that allow to model or simulate complexity. "Systemic problems significantly require cognitive capabilities like cross-linking, structuring and

operationalizing (...). Becoming aware of dynamics in systems illustrates that there can be no simple solutions in a complex pattern" (Forstner-Ebhart, 2015, p. 36). Showcase problems that are dealt with in situated learning environments are used for the illustration of interdependencies. They provoke to meet the pedagogical requirements of deconstruction. The process of deconstruction then leads to a debate with new approaches to solving problems.

Elements of the didactic concept of Green Pedagogy

The learning activity plans of Green Pedagogy are learner-oriented. Communicative competence is acquired interdisciplinarily by testing options and decisions for sustainable action in as many situated learning processes as possible. Pedagogical arrangements for sustainability are to be realised in the areas of e.g. agriculture, nature pedagogics, green care, nutrition, household management, business management and renewable energy. They are to be carried out in cooperation with the core subjects of pedagogy, communication and counseling.

The planning of learning activity plans takes place with reference to objectives that determine communicative competence and subsequently competency to shape the future. Showcase problems are selected in a participatory process involving interdisciplinary planning and execution together with the learners. The individual attribution of significance is determined by the learners. The next step is an exploratory, cognitively constructing process of development, organization and validation of rational concepts. In this process discourse-oriented topics, so-called "hotspots" are taken up. These arise in the reconstruction of a current state and are characterised by high complexity. By means of research, modelling and visualizations different perspectives become apparent.

In a process of co-construction, synergies and divergences relating to the assessment of consequences are recorded, personal attributions of meaning are checked for congruence. The examination of problems on the basis of already existing pathways frequently does not lead to new possibilities. If improvements in a complex pattern are required, however, innovative approaches are necessary. Solutions can already become obvious in the process of reconstruction, but it is important to scrutinize them and assess their sustainability.

The creative process is initiated by an intervention, which invites to question routines and simple solu-
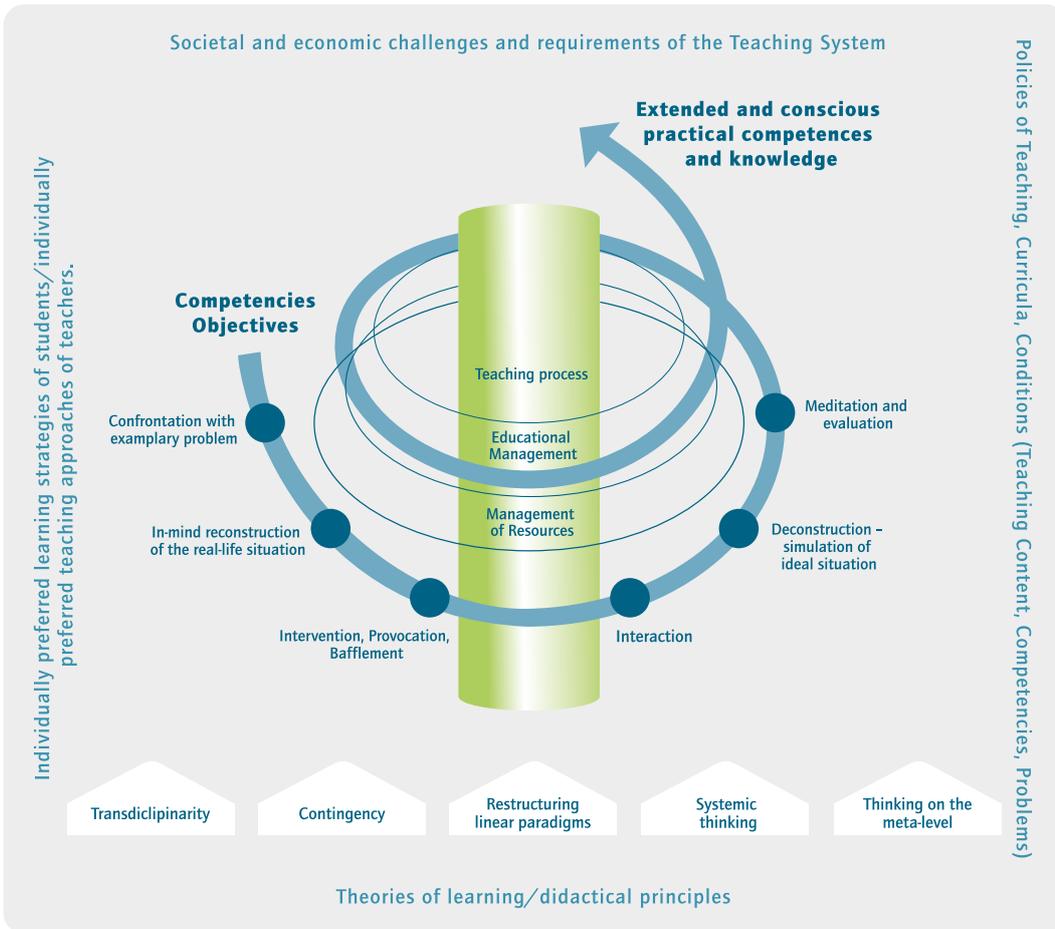
Figure 2: Didactic Concept of «Green Pedagogy»

tions. This can for instance be done by provocation or irritation. In an ideal case linear patterns of thought can be ruptured by apparently disarranging the order of things. This can also take place by an alternating observation of top-down- and bottom-up-effects. When the sensitivity for different approaches and perspectives is enhanced, an analytical discourse begins that serves critical thinking. In a next step and based on the specific situation, learners look for possible effects, further influences or feedback loops and thus pervade connections in systems. This way a deconstruction of existing knowledge takes place. With the help of as many different analytical methods as possible, potential desired situations are scrutinised and tested for their usefulness. In this process the objective is not necessarily finding solutions. Learners should rather reach a high degree of reflecting capacity in order to evaluate the sustainability of actions in cooperative and deconstructing processes. The actual aim is the reflection on personal learning and the observation of personal development after a learning process.

Value of innovation of Green Pedagogy

The conceptualization of Green Pedagogy is anchored at the University College of Agrarian and Environmental Pedagogy. At this institution, multipliers for sustainable action are educated who – owing to the special agrarian and environment-related examination of nature – will be particularly required to approach problems in an interdisciplinary manner. For future teachers and consultants the inclusion of different perspectives for acting sustainably is of notable relevance.

The elements of the didactic conception are based on pedagogical-psychological theories and yet are special for the institution regarding constellation and sequence. For the implementation of the claims of Green Pedagogy in concrete learning activity plans, numerous methodical approaches and evaluation instruments can be employed. This way a multiplicity of approaches is possible. However, those employed need to allow for a critical, participatory, cooperative and reflective examination by the learners with topics in the field of sustainability.

The role of values in Green Pedagogy

Andrea Payrhuber

Value systems influence perspectives

Green Pedagogy is seen as a sustainable means of "knowledge transfer in the ecological field by employing systematic processes of acquisition" (Forstner-Ebhard, 2011) with the focus on recognition. This "recognition" signifies that the learning process needs to encourage a holistic view that is more than the sum of its elements. It is about understanding the complexity of intricate processes as well as reflecting personal attitudes and decisions accordingly.

This cognitive process typically has two actors (or groups of actors): Those who initiate cognition (teachers) and those who attain cognition (pupils, students). This dyadic (or in groups: multiple) relationship leads to the question to which extent the participants exhibit identical or very similar internal perspective or if differing perspectives are present that could cause tensions and if and how these could be resolved. When different people and/or organizations meet in teaching-learning settings of Green Pedagogy, it is very helpful for structured processes to be aware of one's personal perspective (self-perception) as well as those of the other participants. This facilitates comprehending the reasoning of participants in the process.

Starting point for these processes are deliberations on individual value systems. Social psychology sees them as social conditions of experience and action. They are the "latent construct of effects behind numerous social-psychological phenomena" (Strack, Gennerich, Hopf, 2008, p. 90) as well as behind different perspectives and behavioural patterns in pedagogical contexts.

Value systems are fundamental, individual constructs that affect people's behaviour (attaining/transferring cognition) by shaping their attitudes (see figure 1). The individual values exhibit different concretised developmental stages and influence one's personal attitudes as personal guidelines through perception and motivation (motives, evaluation of the motives, decision for realization, action, evaluation of action).

Value systems are important both vertically on the operational level as well as horizontally on the pedagogical-reflective level in order to attain an understanding between different types of value systems.

The value model of Schwartz (1992) orients value systems for the first time in ten segments in a circular fashion. The idea of a hierarchical structure of values as it can be found with Rockeach (1968, 1973) with terminal and instrumental values could not be sustained any longer. Strack and later Hopf are the ones that substitute the given structure with ten segments by a borderless, euclidic space in which the values are arranged in relation to each other. The two axes added to the space by the authors are to be understood as primarily structuring the value circle, rather than acting as rigid, impenetrable borderlines. Both axes are perpendicular to each other, where the vertical possesses the characteristics of universal and egocentric values and the horizontal axis possesses those of self-determination and tradition.

The arrangement of the axes leads to the delineation of four value segments. Starting clockwise in the righthand upper corner they can be described as follows.
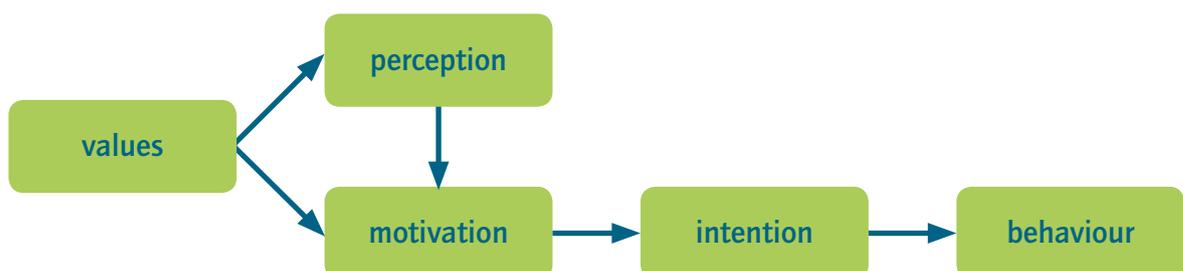
Figure 1: Values influence the behaviour of people (own graphical representation)

1. **Prosocial values:** humbleness, helpfulness, solidarity in the family
2. **Security-oriented values:** security, respect for rules, being respected
3. **Hedonistic values:** fun, enjoying life, diverse
4. **Tolerant values:** nature, tolerance, freedom, independence

The individual position of a person in the value circle results from the interplay of his or her individual value systems. Only the knowledge of the position of the personal value systems (self-perception) allows for a structured-reflective interaction with oneself, one's findings and the perspectives of and on others.

Here three effects need to be emphasised:

1. Within-effect (W):
This effect means that one feels very close to one's own kind, but also that arguments relating to values occur to oneself more readily if from one's own value sector.

2. Effect of assimilation (A):
This effect describes that ways of thinking and arguments of persons from a neighbouring segment can be comprehended quite well as there are at least commonalities along the common edges of segments.

3. Effect of contrast (C):
Here value systems of two segments are in opposition to each other and there are virtually no commonalities. Understanding the values of the other person can only rarely be achieved and communication processes are difficult to activate. Only demonstrating respect for the other's opinion is helpful. This could then be called "clarified hostility" as values cannot be comprehended due to their clear difference. The values of the other person are not the ones that immediately (if at all) suggest themselves when attaining findings, generating ideas or developing concepts.

Value systems influence actions
Already for Weber (1980, p. 1) it was relevant that social action is "relating to the behaviour of others by the intended meaning of the actors". When the understanding for the intended meaning of the other person or persons is missing, fundamental problems or misunderstandings are bound to occur. Common solutions are nearly unattainable. Action in a common intent is impeded. These misunderstandings can be comprehended by looking at the effects that are caused by the different "value glasses", i.e. different ways of value perception. They become visible by

> ❞ A resolution of uncertainty contributes to a reflected world view.

means of teaching-learning settings for the participants in the form of guided metacognitive processes in the sense of Green Pedagogy, as well as in quantitative investigations (e.g. Forstner-Ebhard, Payrhuber, 2013).
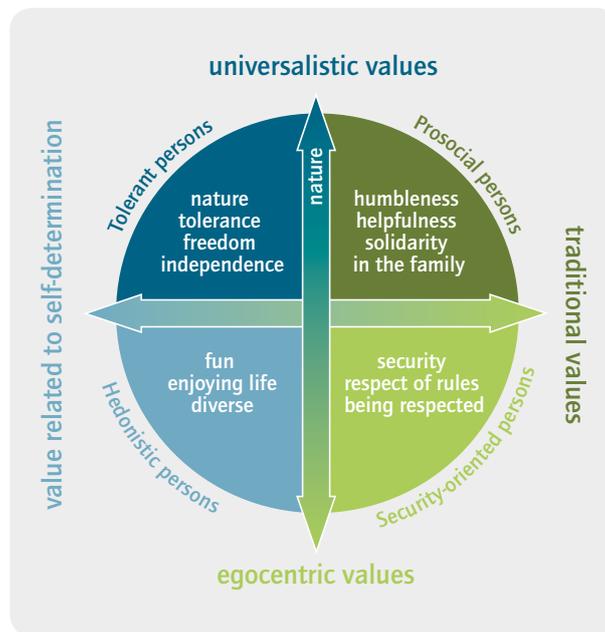
Figure 2: Value circle (by Strack, 2014)
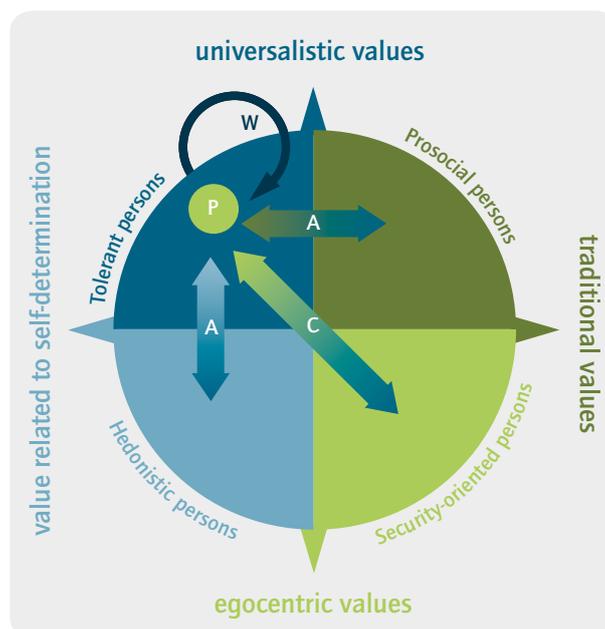
Figure 3: Effects between human beings due to their values (according to Hopf, 2012)

> In Green Pedagogy values signify a step towards objectification and validation of the sought cognitive process.

The intentional recognition of the self-perception and the importance for conveying meaning were implemented together with Norbert Hopf and three groups of students in several educational sessions (of 4 hours each) in the summer of 2015. The students worked in small groups and outlined criteria for a marketing concept for an agricultural product which was selected by each group individually (e.g. direct marketing at the farm of premium organic produce). In a first step criteria were collected that seemed relevant to the students personally, i.e. they also reflected their personal values. In a subsequent step the criteria were ascribed to the value segments and compared to the position in the value circle of the person that came up with the idea. (This test for values was carried out with the participants about a month prior to the exercises in class; for every person the exact position in the value circle was determined and graphically depicted.) In a third step the criteria were complemented by a specific analysis of those value positions that had not or just by a small degree been considered. During this procedure all students showed surprise and also irritation. Discussions on possibilities for dispersing these uncertainties could contribute to a more deeply reflected world view (according to a short-term self-evaluation). Questioning the self-concept can be seen as an important process for Green Pedagogy.

Conclusions

Value systems are variable concepts that are diverse between different cultures, groups of people and individual human beings. They are learned during a long period of socialization and are consolidated in the course of development. As value systems are (also) responsible for the formation of attitudes as well as for the intention for action of every individual human being, they are of crucial importance for Green Pedagogy. Every metacognitive contemplation, every change of perspective, every reflection is influenced by personal values. This is also true for all assessments that are made with respect to other persons, groups of persons and their actions implicitly or explicitly in the daily routine.

The theory of cognition assumes that human beings in their consciousness regarding every-day situations alternate between acting in routines and reflection in order to be able to solve difficulties, confusions and cognitive dissonances. In addition, humans do so in

order to devote attention to specifically interesting topics. In this sense the task of Green Pedagogy is the initiation of a differentiated examination of concrete issues. The examination which is a core element of Green Pedagogy contains a metaperspectivistic approach as well as self-reflection of personal perspectives and behaviours. This way participants, pupils or students recognise alternative patterns of assessment and thinking. Both personal as well as externally habitualised behaviour is seen in in different light. The foundation for this process is occupation with both one's personal values and those of all persons involved in the course of action. The elaboration of potential behaviours considering all relevant social values signifies in the frame of Green Pedagogy a step towards objectification and validation of the sought process of cognition. A conscious deliberation in groups is only possible if all participants are aware of the foundation of the different perspectives. Only in this way can the communicative meaning of the criteria of the othegroup members be understood correctly in their semiotic sense.

It is also important that educators who instruct the procedure in the scope of seminars of Green Pedagogy are aware of their own value systems. Only those who know their own perspective can instruct others to see and comprehend a picture as complete as possible of the actual and potential approaches.

By the deliberate reflection of personal and external value systems and the consideration of socially relevant values, learning processes in the context of Green Pedagogy can create a new way of understanding and a new communicative competence. This allows seeing constructive solutions in situations of economic-ecological dilemmas that are fair for all participants. And those who see solutions and are able to assess their consequences are equipped for shaping their own volition and intention for action less in an emotionally habitualised, but rather in a rationally reflective way. The contribution of Green Pedagogy which makes us politically mature citizens is to allow us to go from understanding the values of all involved and affected people and entrenched behaviours to a constructive way of finding a compromise.

> Green Pedagogy allows the depiction of constructive solutions in situations of economic-ecological dilemmas.

Evidence-based Research Findings of Green Pedagogy

Angela Forstner-Ebhart & Willhelm Linder

Evidence-based Research Findings of Green Pedagogy Research on Green Pedagogy is concerned with conceptional aspects, but also discusses concrete problems and aspects.

Research on the concepts of Green Pedagogy

On the conceptional level, Linder looked at the commonalities between Agrarian and Environmental Pedagogy in order to identify cross-sectoral questions and aspects (cf. chapter Genesis of Green Pedagogy). Currently, Eva Leupolz is concerned with Green Pedagogy as part of her master's thesis, aiming to outline a master's curriculum along the principles of Green Pedagogy.

Both pieces of research started from the assumption that Green Pedagogy represents a concretisation of education for sustainable development for the areas of Agrarian and Environmental Pedagogy. In that case, the pedagogic work with the complex interdependencies between ecological, economic and social aspects constitutes a particular challenge.

Taking pedagogic concepts as a starting point, Forstner-Ebhart in particular examined the pedagogic-methodological basis of Green Pedagogy. Her research was supplemented by bachelor 's theses (cf. chapter Didactic Aspects of Green Pedagogy).

Research on concrete aspects

Green Pedagogy is both in teaching and research first of all a very concrete and practice-oriented matter. It is concerned with key questions of learning in the field of Agrarian and Environmental Pedagogy – on the one hand through its own research foci and on the other hand in the context of bachelor 's theses. A few examples below:

Learning from contradictions

Linder is currently investigating whether and in which settings "learning from contradictions" is appropriate to develop competencies of Green Pedagogy, particularly the ability to think systemically. In the course of this research project, topics surrounding Green Pedagogy that are suitable for "learning from contradictions" are to be identified and examples for methods and approaches for suitable teaching-learning settings to be worked out.

Moreover, a concrete example for a setting should be developed and tested in the context of a teaching session as well as evaluated with regard to the acquisition of competencies in the handling of contradictions.

Suitable topics and questions for research surrounding the field of Green Pedagogy are:

Questions of regionality vs globality (according to Ulrich Beck). Closing regional circular flows is highly desirable from an ecological standpoint, the return to a subsistence economy, however, does not offer a developmental perspective.

Concept of the ecological footprint: The footprint offers simple instructions for an environmentally friendly lifestyle (reduction in transport, fewer animal products etc). The boundaries of this concept become apparent when the footprint is combined with other indicators (e.g. the SPI footprint or the Human Development Index). This creates contradictions that lead to opposite solution models.

Tragedy of the commons: air, water, the oceans are used as common goods. This leads to individuals maximising their yields while harming the resource to the detriment of all. Neither planned economy approaches nor purely market economy instruments offer a way out.

In the context of the research project, contradictions are collected, key concepts are analysed and discussed, and a concrete teaching situation is tested and evaluated with regard to finding an answer to the research questions. Expert interviews are aimed at clarifying how these teaching-learning settings can contribute to the development of systemic thinking.

Bachelor theses and research projects at the University College for Agrarian and Environmental Pedagogy have tried and try to describe certain aspects of Green Pedagogy (e.g. competency to shape the future according to de Haan) and to measure effects in the context of interventions in field research. Research in the framework of Green Pedagogy can be seen as initial empirical evidence that the concept is establishing itself. Nonetheless, future research in this area should be supported.

The bachelor thesis „Vielfalt der Blickwinkel an der Hochschule – Forschung zu Unterschieden und Gemeinsamkeiten in der Bildperzeption von StudentInnen der Agrar- und Umweltpädagogik" (Multiplicity of perspectives at the university – research on differences and commonalities in the perception of images by students of Agrarian and Environmental Pedagogy) by Helene Salcher-Lugger assessed (based on a survey from a research project by the University College for Agrarian and Environmental Pedagogy) differences and commonalities in the perception of images by students of Agrarian and Environmental Pedagogy. Images were used in the qualitative survey to gain insight into the retrospective experiences of students. The respondents' backgrounds were not examined in the thesis, but if hypothetically agrarian educators are marked by an agrarian background and environmental educators by a more urban social background, a "return to their roots" after their education would have broadened their perspective. Agrarian educators as representatives of agriculture preserve the cultural landscape, have a practical approach to food production and a more regional perspective. Environmental educators regard the ecosystem in which humans should take on an explaining function, reflect an attractive consumer group and have a more global view with regard to energy matters. The University College can use this knowledge of commonalities and differences in the construction of its future educational programmes. In the context of planning for Green Pedagogy, there are efforts concerning the link between ecology and economics. To ensure a transfer of knowledge, seminars need to be held jointly (meaning spatially and temporally together). Reich (1998) demands in the context of a constructivist didactic: assembling reproduction (reconstruction), invention (construction) and final exposure (deconstruction). "Reconstructing" often centuries-old knowledge about produc-

tion and cultivation, joint construction of agrarian and environmental educators and a final exposure make agrarian and environmental pedagogy future proof and sustainable. The results of this research are just snapshots of mental images concerning selected natural and cultural landscapes which by trend seem to point to a more global perspective of environmental educators. For the most part however agreement exists for instance in the area of future energy supply where students in both fields regard alternative energy sources such as wind power as sustainable solutions or in both types of students' support for animal welfare. The results of this work point to the necessary co-education of both subjects which can in a constructivist sense mean a reconstruction and deconstruction of individual concepts and enables a diffusion of knowledge between both subjects.

The bachelor thesis by Kathrin Sigl titled "Zum Einsatz von "Lernen durch Lehren" in einem Umweltzeichen-Projekt – Eine Möglichkeit, um die dem Österreichischen Umweltzeichen zugrunde liegenden Gedanken nachhaltig zu vermitteln" ("Use of "learning by teaching" in an Ecolabel project – One possibility to sustainably communicate the thoughts behind the Austrian Ecolabel") examined students' activation for sustainable development in the context of project-based learning on the topic of water. Education for sustainable development according to Green Pedagogy can be achieved on the knowledge, behavioural and emotional level through students' specific use of specific methods. For this project the method was "learning by teaching", where students work on subject matters in small groups to subsequently impart that knowledge to their fellow students. In addition to theoretical knowledge, students should gain key qualifications through cooperative and self-organised learning.

The results of this field experiment from the post-test indicate that the method of "learning by teaching" is suitable for carrying out environmental projects as it enables looking at a complex issue from multiple perspectives. A societal learning process with the goal of taking responsibility for the environment is required to face the challenge of resource-oriented behaviour. A method that focuses on learning corresponds to the image of a learning society in which not only experts impart knowledge, but every member of the learning group is essential for the exchange of learning content. This can also stimulate teachers' reflection on the content and lead to further reflection on the meta level.

Katrin Wabnigg evaluated the realisation of Green Pedagogy according to constructivist didactics using the example of "Umwelt-Peer" ("environmental peer") training in Styria (a federal state in Austria) through a quantitative questionnaire. Dealing with competency of action led the author to analyse it more closely according to constructivist didactics and to explore it using the example of the training and activity of "environmental peers" in Styria. The "environmental peers" were suitable for research as they are trained by the Umwelt-Bildungs-Zentrum Steiermark (Environmental Education Centre Styria) to gain competency of action. Competency of action as an individual's willingness and qualification to act in

an appropriately thought-out as well as individually and socially responsible manner, represents one part of the competency to shape the future. The results of this work indicate that the "environmental peers" improved their conceptual, procedural and strategic knowledge in relation to environmental topics. Also discernible was an increase in the approval of team work and the capacity to self-reflect. Thus important partial goals for the achievement of competency of action could be monitored in the context of Green Pedagogy.

In their research Roswitha Wolf und Heidemarie Wagner are occupied with studies on Green Pedagogy as a platform for educators to create learning environments which can contribute to the development of competencies in adolescence as well as projects titled "Natur und Umwelt – Begabungen entdecken und fördern – Beeinflusst der Umgang mit der Natur die Entwicklung von 3- bis 6-jährigen Kindern?" ("Nature and environment – discovering and nurturing talents – Does interaction with nature influence the development of 3- to 6-year-old children?"). The research activities assess the effects of teaching-learning settings at extramural learning locations on development of competency. The results were taken into account for the development, restructuring and reorganisation of practical experiences at school in the subject of Environmental Pedagogy.

Methods for creative learning processes

Christine Wogowitsch

The simple formula "where there is good teaching, there is good learning" has been invalidated empirically by findings of brain research. Teaching and learning, imparting and appropriating are separate mental operations, their equation would lead to a wrong conclusion about teaching and learning (Klement 2012, p. 10). Especially when educational programmes not only focus on cognitive knowledge, but also the development of well-thought-out actions and self-organisation which enables realistic and ethically fair notions of the economy, resources, consumption and society, then learning processes with lasting impact and combined with a successful transfer of learning are suitable concepts for school and adult education.

If humans are put at the heart of reform processes to advance the education system, the most important goal currently seems to be to equip learners with the ability to act appropriately in concrete unplanned and unforeseeable working situations. Consequently, education means creating conditions where self-organised competencies of action can be connected to education and work processes. In order to not only ensure life-long job prospects for individuals through consistent and continuous learning, but also the further economic and societal development (cf. Schmidt, S. 2005, p. 14) requires learning in a social context.

Learning and teaching focused on enculturation are constitutive of school and instruction. Learning itself is not dependent on school and instruction, but is one of our fundamental characteristics and a necessity of life (Giest 2012, p. 15). Green Pedagogy is characterised by an interdisciplinary, systemic scientific approach featuring multiple perspectives as well as a reference to practice, life, nature and culture. Students are not seen as objects of pedagogic influence, but as subjects that actively progress in their development through their didactic qualifications. Green Pedagogy allows learners to be subjects of their own actions through relevant learning environments, that is to say that they can develop learning motives on the basis of their learning needs by actively tackling a subject matter while building on their learning experiences and ability to act (cf. Giest, Lompscher, 2006).

Potential topics/fields of learning			
Resource protection	**Economy and production**	**Consumption and lifestyle**	**Society and social issues**
ecology and biodiversity	production and processing of resources	lifestyle and consumption behaviour	work/future of work
sustainable resource use and protection (incl. nature conservation)	macro- and microeconomic models of sustainable production and development	product labelling; regional consumption	communication and media
climate change	global production networks; impact evaluation	utilities sector	involvement and participation
sustainable forms of use	Corporate Social Responsibility and Good Governance	health	regional development
ecological, economic and cultural value of ecosystems	performance, values, performance assessment	commons	age, family structures and value system

Table 1

The use of Green Pedagogy is advisable for "hot spots" of controversially discussed agricultural, environmental and societal issues.

The mentioned areas serve as appropriate starting points to situate a future-oriented agrarian and environmental pedagogic education that focuses on humans while considering the gender perspective and personal ways of living in the social, economic and ecological context. As a prerequisite, tensions in the learning process need to be faced openly and their handling must be supported through cooperation and communication.

From a pedagogic point of view, methods are paths that lead to a goal. There is no single correct way, but there are rather various way depending on topic, learners, time and additionally available resources. A well-researched didactic analysis to determine the conditions represents the best preparation to react flexibly to learners' questions, signals or suggestions and take on different roles. In this context, David Hunt refers to "Reading" and "Flexing" (cf. Siebert, H. 2010, pp. 13–15).

Required characteristics of suitable methods in Green Pedagogy

Learning tasks that facilitate ways of thinking, working and acting, support getting an overview, stimulate thought and wonder, allow participation, enable cross-linking, amuse, promote changing and interleaving perspectives, reduce complexity and give structure, meet the required characteristics of Green Pedagogy.

The following deserve special emphasis:
– Problem-based learning
– Process-oriented and linked-up excursions with implementation phases
– Experiments together with inquiry-based learning
– New media for interactive teaching-learning settings
– Life Cycle Assessment and case work
– Theme-Centred Interaction
– Textual interpretation and metaphor analysis
– Reflecting teams for feedback and evaluation processes

Following Luhmann, Green Pedagogy enables students to acquire the competence to prepare themselves for an unknown future through learning activities in complex situations and in various roles as well as taking up not-knowing as a development potential. Green Pedagogy is marked by a divergence from linear models, binding truths, normative and instructive or-

> **❝❞** Learning is never just about the subject, but also always an experience of cooperation and ability.
>
> Rolf Arnold

ders. It leads to non-linear models, insight as construction, and viable, relevant perspectives that become visible through pedagogic action (cf. Schmidt S., 2005, p. 141).

Characteristics of teaching and learning in Green Pedagogy

To exemplify, the following will touch on six characteristics of teaching and learning in Green Pedagogy

Formation of community through cooperation:
Teachers and learners are decoupled from their traditionally assigned roles and become collaborators. Students as "co-construction partners" actively take on the role of thinkers, explainers, interpreters/evaluators, and askers of questions in the social context. Green Pedagogy takes up both a quantitative and qualitative reference framework for knowledge accumulation, the learning process and rating since changes in learning or the acquisition of knowledge would not be discernible or appraisable otherwise. Instructional measures as control mechanisms foster successful cooperative learning processes and contribute to cognitive activation. So called "collaboration scripts" support the form and nature of cooperation and therefore constitute the basis for successful cooperation. Collaboration scripts are in principle characterised by the following features: a sequence of actions or sequencing of the task, a specific role description for the learners and strategies for successful cooperation. The activating and learning-promoting effects while dealing with a task are achieved through the distribution of learning resources as well as the change of roles between teaching and learning. Collaboration scripts are particularly well suited to work on unknown and complex texts.

Reflection:
Interaction-promoting elements, such as e.g. the written or oral reflection of learning by group members enable challenging and sustainable learning processes. Collectively comprehensible performance assessment requires extended reflection both on the learning process and the learning results. Learning journals, research diaries or portfolios have proven to be suitable

forms of reflection or documentation.

Contingency:

Contingency refers to ambiguity or chance and describes the freedom that fosters positive thinking in a learning process. It requires freedom to develop and is seen as a prerequisite for creativity and agility. Actors are asked to make a decision concerning a course of action on the basis of the means available at a particular time and communicate as well as reflect that decision to relevant people. Contingency is therefore a prerequisite for an experience of reality that is practical with regard to cognition, action and communication and goes beyond purely cognition-oriented experiences (cf. Schmidt, S., 2005, p. 42 ff.). This results in the wide and deep involvement of students in all phases of the learning process and supports their experience of reality and a lasting impact.

Operations/activity:

In Green Pedagogy, the critique of constructivism concerning the direct application-orientation of teaching-learning processes is met with the fact that over the course of the transfer of practice, the personal observation capacity takes on a new dimension as a result of the perception of the difference between the start and end of a learning process. On the basis of solutions to problems, the aspired goal and the coupling with the social context, routines are broken and confidence in complex situations is built through metacommunication. Textually well-structured assignments facilitate content analysis and the structuring of problems as well as the development and illustration of interdisciplinary ways to reach a solution. Communication plays an essential role for working in a group and receives special attention in all phases of activity.

Irritation:

Using the concept of irritation from Luhmann's systems theory allows to name experiences of discrepancy caused by the experience of newness and unexpected strangeness. Learner's irritability is regarded as a prerequisite for constructive learning causes. According to Holzkamp, learning is only possible due to an experience of discrepancy of learners. From the action problem arises a learning problem and enables learners to change perspectives (cf. Nolda, S., 2008,

p. 87). Through new possibilities opened up this way, learning processes gain momentum and learners develop routines for the confrontation with initially unfamiliar situations.

Emotion:

Constructivist, cognitive- and activity-theoretical learning models emphasise the emotional component during the process of learning. It has been proven that accompanying emotions that leave an impression increase memory capacity (Gudjons, H. 2012, p. 226). Green Pedagogy takes up this approach and emphasises the reality perceived by learners as a learning cause. Interest, pleasure, amazement, surprise, vigilance etc. strengthen the impression of an area of learning. Green Pedagogy uses the potential of these effects to increase the activity of learners and as positive drivers for subjective experiences in class.

Green Pedagogy enables learning processes with a lasting effect

Sustainable education should be understood as an attribute for education with a lasting impact. A successful transfer of learning leads to an increase in the density of interpretation networks and the acceleration of associative and deductive thinking. Through demanding process-oriented learning activity plans in real and virtual spaces, Green Pedagogy manages to apply or supplement what has already been learned in a new context and to question subjective patterns of interpretation and emotion (cf. Arnold, 2007) from multiple perspectives. Contradicting questions are incorporated as constructive elements into Green Pedagogy and dealt with as part of expansive learning processes that are value-oriented and focus on the development of emotions.

Selection of methods from the University College for Agrarian and Environmental Pedagogy's methodological workshop

The selection of suitable methods in Green Pedagogy requires a change of perspective, on the one hand concerning the epistemological approach and on the other hand by the teachers themselves concerning their function in class. The following pages offer examples of methods that can be used in Green Pedagogy (selection of methods by Beate Kralicek).

At a glance!

Goal: *illustrating complex relationships, getting an overview*

Brief instructions: *You conquer a complex topic with your learning group. You lecture and gain experiences on field trips, the participants read and exchange their thoughts... After all this "opening up", it helps to organise thoughts, create a personal map. Learners get the task to visualise the essential contents and particularly their relationships in a picture, a map, an overview. They may do that on their own, in pairs or in small groups. Suggest working with symbols, lines, arrangements to create a visible "subject map". Learners can then present and explain their maps to other participants or the whole group.*

Duration: *30 minutes to 2 hours*

Material: *poster-sized paper, pens*

Possible applications: *field trip reports, practice reports, theme posters, assessment (exam)*

Observation tasks

Goal: *sharpening personal perception, dealing with a topic outside of class, observing and questioning personal behaviour*

Brief instructions: *At the end of a lesson, learners get a week-long observation task. Over the course of the next few days until the next lesson, they are tasked with observing something about their own behaviour, the behaviour of others, e.g. in traffic, while shopping... Maybe the task includes a short observation report. The following week, there is a short exchange about the experience e.g. with a neighbour (buzz groups) or as short stories with the whole group. A related method is the "question for further contemplation". The learners get a "question for further contemplation" at the end of the lesson which they are asked to ponder, think and talk about with fellow students.*

Duration: *during the lessons: 3 to 10 minutes; during students' "spare time": depending on task*

Material: *possibly task handout*

Possible applications: *meat consumption, animal husbandry, conservation ...*

Staging ("The green curtain")

Goals: *transferring or staging a subject matter – translation; visualising a topic's contradictions*

Brief instructions: *The lecturer/teacher writes down a perspective concerning a certain topic on a perspective card. The participants draw a card and are tasked with staging a topic (3 groups).*

Duration: preparation: *15 minutes; performance: 5 minutes max.; reflection and documentation with the whole group: roughly 15 minutes*

Material: *perspective cards*

Possible applications: *genetic engineering, soil cultivation ...*

Critical thinker

Goal: *taking a position, arguing, discussing*

Brief instructions: *The participants have dealt with a (controversial) topic in depth. To conclude they prepare themselves for a dialogue with a "critical thinker". These critical thinkers" can take many forms in our everyday lives: journalists that question our positions, sceptical colleagues and friends, superiors that we want to convince of our position. The dialogue with critical thinkers helps us to clarify our own stance. A person from the teaching staff – or you as a teacher – take on the role of the critical thinker. After the learners have prepared for discussion in small groups, one of each team faces the critical thinker. The critical thinker asks swiftly and brusquely, "Why is that?", "Can you prove that?", "If so, how?", "What is your response to position x?". Knowledge is refreshed and positions consolidated in a quick debate. What joy, when learners can easily withstand the critical thinker's probing questions.*

Duration: *preparation in teams: up to 15 minutes; discussion: 2 to 4 minutes per conversation*

Material: *none*

Possible applications: *text, minutes, essay for a newspaper, web portal, newsletter ...*

Chit-chat or chatroom

Goal: *exchange among learners, pervading a topic in a safe space*

Brief instructions: *Many topics within Green Pedagogy deal with different perspectives, attitudes and approaches. Besides thinking and learning in the whole group, you allow students in your lessons to exchange their thoughts in a familiar "chit-chat group". They talk about certain contents. Potentially, you decide to establish permanent "chit-chat groups" that come together repeatedly. As an aid, you can provide the groups with guiding questions or cue cards. Learners can take 5, 10 or 15 minutes to chat in their small groups (2, 3 or 4 people). You can also ask for a short report on a guiding question, e.g. "What were your most important thoughts?" after.*

Duration: *5, 10 or 15 minutes per chit-chat*

Material: *none*

Possible applications: *all complex subject matters from the fields of agriculture, environment or nutrition*

Interim results

Goals: *pausing during the learning process, checking what has been learnt and how that can be used and applied personally*

Brief instructions: *Learners come together in pairs during the learning process to interview each other. Person A starts and asks person B the questions:*
1. What have you learnt today?
2. And what will you do with that? (or: And what does that mean for you?)
As Person B is answering, person A takes notes of the aspects that seem relevant to them on a card. After person B has answered the second question, person A asks again, "What else have you learnt today?". The questions may be asked two, three or even four times. Now, person B has to go ever deeper. Finally, person A presents their notes and the two people change roles.

Duration: *20 to 30 minutes*

Material: *cards, pens, flipchart with both questions*

Possible applications: *all subject matters from the fields of agriculture, environment or nutrition*

Planning of learning scenarios

Angela Forstner-Ebhart & Christine Wogowitsch

The orientation along the guiding questions and terms of Green Pedagogy (cf. p. 20 ff.) is advisable. The goal of planning is not the development of entirely new subjects or contents, but rather aligning existing topics with the principles of Green Pedagogy (cf. p. 18, 32, 33, 46, and 47) in order to contribute to sustainable development and acquiring competencies for the future. The following rule of thumb applies to the planning and evaluation of teaching-learning settings: as many aspects as possible should be considered to satisfy the subject-oriented, interdisciplinary aspirations of Green Pedagogy.

Green Pedagogy

- Co-contruction modelling
- Emotional involvement, subject-related goal setting
- producing sustainably
- learning motivation
- developing sustainability
- making a lasting impact
- teaching-learning setting
- Exemplarity and relevance
- social exchange
- developing community
- Competency development
- Irritation
- thinking in systems
- Reflection
- Multi-perspectivity
- Evaluation and reflection

Planning matrix:

Guiding concept	Guiding principle	Guiding question	Lesson planning
relevant teaching-learning settings, exemplarity, relevance	Target audience analysis	Which prior knowledge can be activated among learners? Does the learning activity plan enable learners to build on that knowledge?	
	Problem orientation	Does the learning activity plan offer a relevant problem for controversial ecological, economic and social discussion as a starting point?	
	Didactic reduction	Does the chosen learning activity plan conform to the rules of didactic reduction for exemplary learning?	
Producing in a sustainable manner	Learning subject	Does the presented learning activity plan allow for joint goal creation between teachers and learners, so that learners do not become the objects of learning?	
Learning motivation, emotional involvement, subject-oriented goal creation	Emotions	How can emotions be introduced and considered from the beginning and over the course of the whole teaching-learning setting?	
Co-construction, modelling	Contingency	In what way does it become possible for learners to construct their own ideas and to examine their usefulness?	
Developing community, social exchange	Cooperation	Which possibilities to work on tasks given exist in order to best carry out the distribution and use of learning resources?	
Competency development, irritation	Irritation	Do teaching-learning settings deal with irritations (meaning perturbation to stimulate learning) that, with the help of a change of perspective, lead to solutions/ compromises/ further developments?	
	Independent activity	Which inputs (media, short lectures, expert interviews etc.) are made available to learners so that subsequent tasks can be accomplished independently?	
	Guidance of learning process	What does guidance of learners during the learning process look like?	
	Performance	Which competencies can be gained with this teaching-learning setting? How can learners demonstrate their learning progress (performance)?	

Guiding concept	Guiding principle	Guiding question	Lesson planning
Thinking in systems, multi-perspectivity	Multiple learning approaches	Can the methodological application be used to model varied approaches in order to illustrate complexity?	
	Breaking up linear thinking patterns	Which suggestions/methods are given/applied in order to break out of linear thinking or thinking routines?	
Evaluation and reflection	Metacognition	What does reflection about the personal learning process in the teaching-learning setting look like (metacognition)?	
	Reflection	Which feedback methods can be used to assess formatively and steer the learning process?	
	Evaluation	How could the evaluation concerning the achievement of learning objectives take place in a teaching-learning setting?	

Learning at sites outside of campus

Teaching and learning sustainability related to practice

Maik Adomßent

Sustainability is an issue that is on everyone's lips. But at the same time uncertainties often exist as to what education at universities and university colleges in that matter could look like. How can students acquire the scientific competences and basis that are necessary for them to contribute to solving complex problems in an environmental and sustainability-related context in a way that is both action- and future-oriented. The Leuphana University in Lueneburg (Germany) offers the academic program "Science initiative sustainability" which comprises numerous innovative educational offers for bachelor, master, and doctoral students as well as for professional development with a focus on practical implementation. The following practice-oriented examples on an undergraduate level illustrate how approaches related to sustainability for tertiary education in Lueneburg are concretised.

> " A tertiary education for sustainable development not only benefits the parties involved within the university, but it also has positive effects beyond the perimeter of the university campus."

The program of studies in Lueneburg contains distinctive interdisciplinary cornerstones with both the so-called "Leuphana-semester" and complementary studies carrying 30 ECTS each. https://www.leuphana.de/en/college/first-semester.html

Since its introduction in 2007, all 1,500 students have taken the module "Responsibility and Sustainability" in their first semester and have selected from a rich range of courses (about 200 per semester) in complementary studies from the second until the sixth semester. This model is unique in the German university landscape both in a structural as well as in a didactic respect. This approach is structurally anchored and thus allows all bachelor students – independent of their chosen major – to be introduced to sustainability issues from the first semester and gain a responsible attitude for their further lives. Students experience the fruitful academic combination of science and teaching early on and first hand. Didactic approaches range from inquiry-based learning and service learning to learning outside of the university.

Inquiry-based learning – interleaving research and teaching related to sustainability

The means of transdisciplinary research in the fields of environmental and sustainability-related sciences gained importance during the last two decades. They are aiming at a convergence of the production of knowledge and societal transformation. The understanding of complex, realistic problems should be enhanced through cooperation between scientists and

representatives of other areas of society. Pathways for change should be elaborated and initiated together. In order to strengthen this type of research new ways of teaching are required that allow practicing trans-disciplinary collaboration. A suitable format for this purpose is inquiry-based learning.

In project workshops of the module "Responsibility and Sustainability" students discover the spheres of research in the sense of inquiry-based learning already during their first semester. They formulate hypotheses on their own regarding sustainable development and validate them in manageable projects in groups of 20 to a maximum of 30 people. The motto of the module in the fall semester 2015/16 was "Future city Lueneburg 2030plus". There students dealt with different fields of action in about 20 workshops and were supported by mentors. Mentors are experts for the respective fields of action and are professionally active in city administrations, labour unions, employer representation, environmental associations, commerce and the cultural field. Together with the groups they elaborate visions for numerous topics like heat supply, tourism, youth delinquency, health or families and lifestyles. At the end of the semester in the frame of a week at the university open to the public, these visions are presented and discussed with guests from politics and the civil society.

Inquiry-based learning

Learning at sites outside of campus

Sustainability by change of perspectives: Service learning in the complementary studies

As demonstrated, a tertiary education for sustainable development not only benefits the parties involved within the university, but it also has positive effects beyond the perimeter of the university campus. This can be illustrated by a variety of examples in the field of service learning (an approach originating in the USA) which combines studies related to a certain discipline with societal engagement. Hereby solutions offered by students for unsustainable developments in ecological and social contexts are put into practice.

A typical example for such an approach are the complementary studies of the Leuphana Bachelor that offers the perspective "Projects and Practice" as one of six optional perspectives on science. There students deal with the conception, planning and/or execution of projects and practical activities in the frame of internships. "Projects and Service Learning" comprises one of the three aspects of this perspective. The aspects of sustainability and orientation towards action take a central part in the mission statement of the university. Hence it immediately suggests itself that

sustainability as well as access to Service Learning manifest themselves in this and numerous other perspectives. More precisely, in the summer semester of 2015 the following courses were offered amongst others: Organization of a sustainable music festival, social entrepreneurship & social enterprises in developing countries, sustainability management of film productions, arts, culture and sustainability – a project day for teenagers, social aspects of sustainability using the example of micro projects of development cooperation in Africa and Latin America.

Additionally, it is of importance to the Leuphana University in Lueneburg to encourage and appreciate the societal engagement of students beyond courses. For this reason voluntary work in initiatives, projects and action groups is recognised in the frame of the annual "Dies Academicus" (University Day) in the specifically created category "Service Learning".

> Service learning (an approach originating in the USA) combines studies related to a certain discipline with societal engagement.

Future prospects of Green Pedagogy

Andrea Payrhuber & Wilhelm Linder

The University College for Agrarian and Environmental Pedagogy were given three awards by the Austrian Commission for UNESCO for its initiative and work on Education for Sustainable Development. They were awarded for the subjects Agrarian Pedagogy and Environmental Pedagogy as well as the course Horticultural Therapy. This can be seen as a recognition that the University College is making exemplary contributions UN Decade for education in sustainable developement

The establishment of Green Pedagogy over the past years created a joint foundation. Now it is a matter of shaping Green Pedagogy and further developing initiatives and key areas.

In a survey conducted by Andrea Payrhuber in December 2012, lecturers and students were surveyed about values ascribed to Green Pedagogy. The respondents were asked to assess values as to whether or not they apply to Green Pedagogy. (1 = applies completely; 5 = does not apply at all)
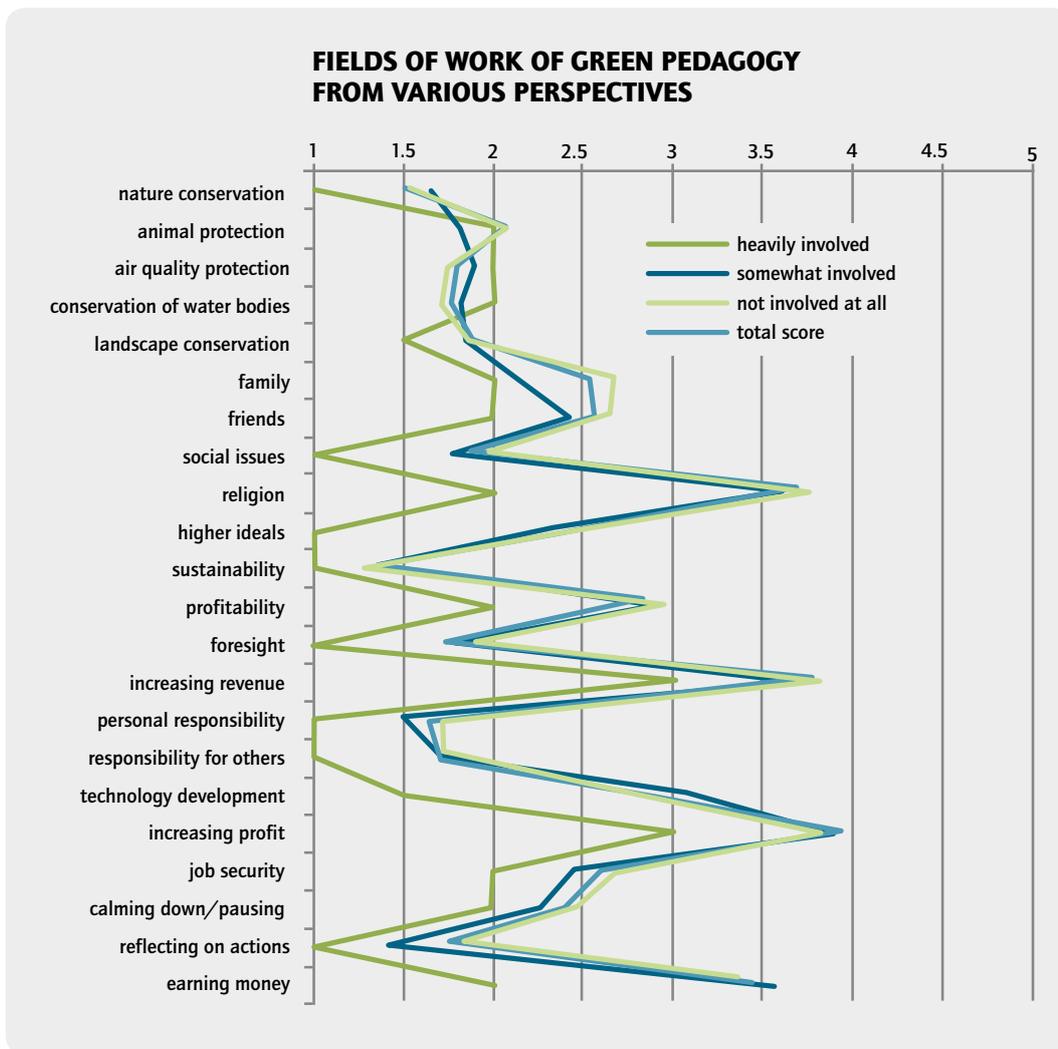
Fig. 5: Values ascribed to Green Pedagogy

Fig. 5 illustrates a clear relation between the level of involvement (heavy/some/no involvement – surveyed as self-assessment) and the attribution of certain values. This allows us to identify that the fields of work in the ecological, economic and social areas of Green Pedagogy: particularly "nature conservation", "social issues", "religion", "higher ideals", "technology development" and "earning money" are viewed more strongly as values of Green Pedagogy by the heavily involved respondents than by less involved people.

**" Potentials always exist;
we too rarely concern
ourselves with them!**

Sonja Radatz

Methods and tools need to be developed, tested and their effects evaluated in teaching-learning settings. There is a great need for research here, for instance on the impact of electronic media, the use of techniques such as "future conferences" or the effects of teaching-learning settings in the context of programmes such as "Schule am Bauernhof" ("school on the farm"). Green Pedagogy would be misunderstood if it was limited to the optimisation of methods. The individual measures must always be considered with a view towards an overall concept and satisfy the requirements of current research and teaching.

Here, the concept of Green Pedagogy needs to be further consolidated and substantiated. Aspects to link the concepts to the development of competency to shape the future (Gerhard de Haan) or the OECD framework for core competencies need to be strengthened.

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