CASE
Competencies for a sustainable socio-economic development

Joint CASE Report on Content and Methods for the Joint Master Program on Sustainability-driven Entrepreneurship

Deliverable of Work Package 3 (WP3) - Content: Sustainable socio-economic development and sustainable entrepreneurship

Deliverable of Work Package 4 (WP4) - Methods: Inter- and transdisciplinary teaching and learning methods

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List of acronyms

CASE	Competencies for A sustainable Socio-Economic development
CSR	Corporate Social Responsibility
EE	Entrepreneurship education / Education for entrepreneurship
ESD	Education for sustainable development
HEE	Higher education for entrepreneurship
HEI	Higher education institutions
HESD	Higher education for sustainable development
KA	Knowledge alliance
UN	United Nations
UN-DESD	United Nations Decade on Education for Sustainable Development
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
RCE Vienna	Regional Centre of Expertise on Education for Sustainable Development Vienna
RIS3	Research and innovation strategies for smart specialization
SDG	Sustainable Development Goals
WBGU	Wissenschaftliche Beirat der Bundesregierung Globale Umweltveränderungen (German Advisory Council on Global Change)
WCED	World Commission on Environment and Development
WP	Work package
WU Vienna	Vienna University of Economics and Business

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1. Introduction

1.1 About this report

1.1.1 The Challenge – Creating a Joint Master Program on Sustainability-driven Entrepreneurship

If universities fulfill their often stated role as major driving forces of sustainable change (Scott et al., 2012), they must change their central functions and the ways they interact with the world outside of classrooms and laboratories (Lozano, 2006). In the area of teaching and learning, this transformation has started through the integration of sustainability-related topics into existing curricula (Thomas, 2009; Thomas, 2016). Nevertheless, in many cases this change of curriculum is limited to the question of "what" to teach, but does not sufficiently tackle the related issue of "how" to teach. Curricula need to reflect sustainability issues and a pedagogical framework which relates to Education for Sustainable Development (ESD) and transformative learning.

The CASE project develops a joint master program on sustainability-driven entrepreneurship in a university-business knowledge alliance. However, it is not only for the development of the master program that university opens up to consider and integrate further stakeholder perspectives into the process. The future students shall learn in a transdisciplinary learning environment, steadily researching and integrating real-world needs and perspectives to develop competencies that enable them to solve complex sustainability-problems in their further careers.

In the CASE project, we aim to avoid the indicated gap between sustainability-oriented, real-world contents and not corresponding pedagogical frameworks. We connect the development of contents and methods in the two interlinked work packages 3 and 4 in terms of process and outcomes (see Figure 1 for an overview of the WPs that contribute to the development of the master program). WP 3 is focusing on relevant content areas for the master program and WP 4 is analyzing innovative methods to foster competencies of sustainability-driven entrepreneurship. The output of the two WPs is this joint report describing the joint development process, giving background information on relevant content areas for sustainability-driven entrepreneurship and adequate teaching and learning approaches. In the course of the development process of WP 3 and WP 4 we considered different regional requirements and needs of the universities that are part of the CASE consortium and further stakeholders via participatory multi-stakeholder workshops. In chapter 1.3 we describe this process in detail and particularly elaborate on the multi-stakeholder approach chosen in the CASE project. This development process first covered clustering relevant topics to thematic areas, then structuring these into modules and courses with various teaching formats. Finally, we added recommendations for concrete teaching and learning methods.

The report outlines modules for a master program that are designed to foster competencies of sustainability-driven entrepreneurship. Since the overarching aim of the CASE project is to develop a joint master program that can be adopted by various European universities, we are ambitious to create modules which are adaptable and can flexibly be implemented in different regional contexts and under differing conditions of universities.

With this report, we are sharing our knowledge and experiences gained so far to make them accessible to HEIs, company partners and all other stakeholders interested in the topic of sustainability-driven entrepreneurship and in innovative teaching and learning methods.

The next step in WP 5 and WP 6 of the CASE project will be to test particular modules with innovative, transdisciplinary teaching and learning approaches as regional pilots in order to find out how the module

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concepts can be adapted, detailed and implemented at universities. Doing this, a strong focus will be on testing different cooperation formats between higher education institutions (HEIs) and business partners as well as innovative teaching methods for transdisciplinary teaching and learning with a particular focus on sustainability-driven entrepreneurship.

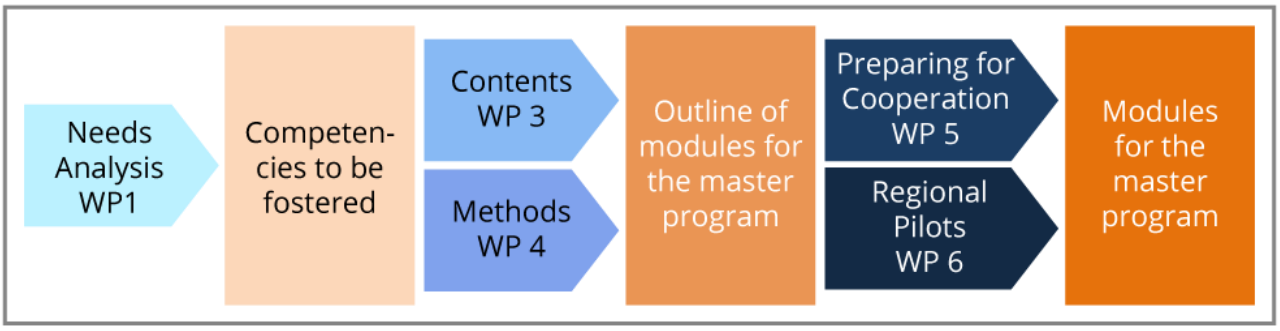

FIGURE 1: PROCESS OF DEVELOPING THE JOINT MASTER PROGRAM ON SUSTAINABILITY-DRIVEN ENTREPRENEURSHIP

1.1.2 Overview of the report

The introduction will first outline the competence-based and multi-stakeholder approach for developing the modules of the master program. It describes the project activities that contributed to the development process of WP 3 and WP 4. Then, we summarize which competencies should be fostered through the Joint Master Program on Sustainability-driven Entrepreneurship according to theory, empirical literature and stakeholder opinions collected through the multi-stakeholder activities. These competencies are the starting point from where the content and adequate teaching and learning approaches for the master program have been developed.

Section 2, the report of WP 3 – content, is a description of the thematic fields that should be addressed in the master program. In section 3, the report of WP 4 – methods, we explain and depict teaching and learning approaches for the master program. Section 4 presents the joint results of WP 3 and WP 4 in form of a general outline for the master program and specific module descriptions. The results are the basis for testing and evaluating cooperation formats via regional pilots in terms of a bundle of courses (WP 5 and WP 6) as the next step within the project.

Section 5 is an outlook on the conception of teacher training seminars that aim at preparing lecturers from different universities within Europe to teach within the Joint Master Program on Sustainability-driven Entrepreneurship.

1.2 Starting point – Competencies to be developed

In the sense of a competence-oriented approach in higher education, we chose a backward design for a competence-oriented development of the master program (cf. Schaper, Reis, Wildt, Horvath, & Bender, 2012). First, we assessed what should be the learning outcomes of the master program for students in terms of competencies (cf. Bernhardt et al., 2015). And then we started to design the modules focusing on teaching and learning arrangements that foster competencies. Competencies include content as well as process knowledge (*know what* and *know how*), but furthermore they also include attitudes, motivation and skills.

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Following Rieckmann (2012, p. 129), competencies are „individual dispositions of self-organization which include cognitive, affective, volitional […] and motivational elements". Wiek et al. (2016, p. 242) underline, that "competencies […] accommodate the topical knowledge required for successful problem solving in a particular context". Competencies facilitate self-organized action in various complex situations, dependent on the given situation and context. Competencies can be fostered: They are acquired during action – on the basis of experience and reflections. Or put differently: Competencies cannot be taught, but have to be developed (cf. Weinert, 2001). The development of competencies is fostered by a constructive alignment of corresponding contents, teaching and learning approaches and assessment tasks (Schaper et al., 2012).

As we have chosen a competence-oriented approach, the CASE project not only developed a basic understanding of competencies that are needed in the areas of sustainability and entrepreneurial higher education according to the state of the art, but also builds on practical learnings from a needs analysis (Bernhardt et al., 2015) and workshops implemented during the CASE project. The following part provides a summary of the theoretical foundations as well as an analysis of the empirical data concerning desired competencies for sustainability-driven entrepreneurship.

1.2.1 Theory and Literature on competencies for sustainability-driven Entrepreneurship

Key competencies for sustainable development according to Wiek et al. (2011)

Key competencies are defined as competencies with a special significance in order to develop important social goals concerning a special framework like sustainability (Rieckmann, 2012). More than domain-specific competencies key competencies "require a high degree of individual reflexivity" (Rieckmann, 2012: p. 129). With regard to sustainability, Wiek et al. (2011, p. 204) define key competencies as "essential for sustainability that have not been the focus of traditional education and therefore require special attention". Key competencies for sustainability are linked to a context, which is highly characterized by complexity, uncertainty, rapid social change, individualization, diversity, uniformity, etc. (Rieckmann, 2012). Therefore it becomes crucial that key competencies for sustainability have to be seen as such competencies which enable people to solve problems in a successful way "with respect to real-world sustainability problems, challenges, and opportunities" (Wiek et al., 2011, p. 204). Wiek et al. (2011) distinguish five sustainability key competencies: systems thinking competence, anticipatory (or future thinking) competence, normative (or values thinking) competence, strategic (or action-oriented) competence, and interpersonal (or collaboration) competence. Recently, they have added a sixth competence: integrated problem-solving competence, which is described as a "meta-competence of meaningfully using and integrating the five key competencies for solving sustainability problems and fostering sustainable development" (Wiek et al., 2016, p. 243).

Competencies for sustainability-driven entrepreneurship according to Lans et al. (2014)

Lans et al. (2014) deal with the competence discourse in entrepreneurship education and education for sustainable development and ask "which competencies constitute the heart of entrepreneurship and sustainable development (i.e. sustainable entrepreneurship)" (Lans et al., 2014, p. 38). They define entrepreneurial competence as "the ability to identify and pursue entrepreneurial opportunities within a specific position and context" (Lans et al., 2014, p. 39). In this sense, on the one hand the following competencies are identified as elements of entrepreneurial competence (Lans et al., 2014, p. 39): opportunity competence, social competence, business competence, industry-specific competence, and entrepreneurial self-efficacy. On the other hand, competencies for sustainable development in a business environment are (Lans et al., 2014, p. 40f.): systems-thinking competence, foresight-thinking competence, normative competence, embracing diversity and interdisciplinarity, interpersonal competence, action competence and strategic management. Through focus groups discussions with university teachers both lists

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were integrated in a list of sustainable entrepreneurship competencies (Lans et al., 2014, p. 43): systems thinking competence, embracing diversity and interdisciplinarity, foresighted thinking, normative competence, action competence, interpersonal competence, strategic management competence, and entrepreneurial self-efficacy. In short, sustainability-driven entrepreneurship needs specific key competencies in order to respond in an effective way to sustainable socio-economic demands.

1.2.2 Learning with and from stakeholders

The needs analysis conducted within the CASE project outlines in its results the competencies to be fostered according to the interviewed partners from HEIs and business partners (Bernhardt et al., 2015). These are underlined and extended by results gained from the workshops with various stakeholders in Vienna and Vechta in WP 3 and WP 4 (see chapter 1.3) as well as from a systematic literature review (see chapter 3.2). These findings were also presented at the 6th Leuphana Conference on Entrepreneurship in Lüneburg, Germany, 14.01-16.1.2016 (Lintner et al., 2016), submitted as a paper entitled "Mind-sets and competencies for Sustainability-driven Entrepreneurship" and are currently under review for a special issue of the International Journal of Entrepreneurial Venturing focusing on "Creating Solutions with Sustainable Entrepreneurship".

In-depth assessment of key competencies for sustainability-driven entrepreneurship

Already in the needs analysis of the CASE project the competence model by Wiek et al. (2011) has been used as a theoretical framework for analyzing the data from the interviews. In order to comprehend the specific key competencies for sustainability-driven entrepreneurs a broader framework is necessary. Therefore a further analysis of the results is linked to the theoretical framework developed by Lans et al. (2014), as it shows increased sensitivity to the particular needs of sustainability-driven entrepreneurs. Wiek et al. (2011) concentrate their study on a broad literature review whereas Lans et al. (2014) focus on HEIs. However, none of them is taking into consideration the direct experiences of practicing sustainability driven-entrepreneurs. The CASE project contributes in filling this gap as it emphasizes a participatory multi-stakeholder approach via an active involvement of sustainability-driven entrepreneurs (see chapter 1.3). Following the five most crucial competence fields (systemic, anticipatory, normative, strategic and interpersonal competence) for sustainability-driven entrepreneurship are explained and summarized in Figure 2.

Systemic Competence

As the world in general and specifically the business world become more complex, it seems crucial to develop competencies for system thinking especially regarding a circular economy (Wolf, 2014) rather than a linear one. Clearly the interviews reflect that a society representing a circular economy requires other knowledge, skills and attitudes, compared to our current society, where for instance systems thinking and inclusivity are more important, besides regular entrepreneurial competencies (Wolf, 2014). To sum up, there are three main key concepts, which the interview partners define as systemic competencies: the ability to cope and to understand the complexity of sustainability, the ability to understand the interconnectedness of various scales and the ability to change perspective.

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Anticipatory Competence

In defining anticipatory competencies interview partners refer to the need for long-term, solution-oriented thinking. Long-term thinking, as a second key concept concerning anticipatory competence, means for most interview partners the active confrontation with uncertainty and risk. Coping with uncertainty in an appropriate way calls for the ability of self-reflection and to reflect socio-political and environmental development. In this context it is important to learn from experiences, also from failures, and to use the insights for scenario building of a sustainable world. That goes along with the ability to realize and develop potentials/capabilities for a sustainable future, which interview partners define as the third most important concept within anticipatory competence (cf. Wiek et al., 2011; Gardiner & Rieckmann, 2015).

Normative Competence

As another particular competence for sustainability, Wiek et al. (2011) as well as Lans et al. (2014) define normative competence. Also for most of the interviewed partners a specific concept of ethics is the basis for sustainability-driven entrepreneurship. “Ethics” is interpreted as a certain set of values, which help to make every day`s decisions in favor of sustainability. Values of sustainability are put in the center, function as an axis for decisions in daily business and allow developing the competence to distinguish between alternatives and act autonomously in critical situations of dilemmas and contradictions. Following the study of Lans et al. (2014) normative competence is more important for the sustainability world and not so much for the entrepreneurial world. Connecting these two realities, the interviews show that for sustainability-driven entrepreneurship doing the right thing is a fundamental prerequisite for action.

Strategic Competence

Strategic competence is crucial for entrepreneurship in general. In complex and rapidly changing economic environments, interview partners reflect, they become even more important. Strategic competence is regarded as a set of skills that includes the ability to recognize and analyze problems, see new opportunities and possible solutions and to bring sometimes highly idealistic visions, ideas and solutions of sustainable entrepreneurship “down to earth” in terms of strategic acting (Parrish, 2010). Moreover, innovation is regarded as a key concept for strategic competence, as many European small and medium-sized enterprises face harsh international competition and secure their survival through building up innovative niches. Controlling seems even more important for sustainable entrepreneurship than for “normal” enterprises not only because of higher costs of resources or labor, but as a substantial instrument for measuring the impact of decisions, establishing feedback loops and adequate control mechanisms.

Interpersonal Competence

Interpersonal competence seems to be very important for sustainability-driven entrepreneurs as they have to deal with complex realities and transformation processes calling for more dialogue than usual business processes focusing on the success of a single company. The analysis reveals that transformation towards sustainability-driven entrepreneurship is not a mechanistic process but very much a matter of a culture of cooperation and interpersonal relations in order to encounter the complexity of sustainability challenges. The ability to work in networks, especially to work in multi-stakeholder networks, is regarded as crucial. Following the results of our study, entrepreneurs underline the importance of linking different forms of knowledge in order to create a more stable ground for their actions. As entrepreneurs point out, it is crucial to be able to think and work not only in an interdisciplinary way, but also in a transdisciplinary way (see Schaltegger et al., 2013): Entrepreneurs recognize the importance of linking their entrepreneurial expertise

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with others, but underline the cooperation with universities in order to give an additional scientific value to their work.

Competencies fields	Systemic Competencies	Anticipatory Competencies	Normative Competencies	Strategic Competencies	Interpersonal Competencies
Relevant concepts	Coping and understanding complexity of sustainability	Intergenerational thinking, time reference	Specific concept of norms and ethics in favour of sustainability	Openness for possibilities	Work in multi-stakeholder networks and sustain them via culture of cooperation
	Understand interconnected-ness of various scales	Cope with risk and uncertainty	Intrapersonal competence to distinguish between alternatives	Innovative thinking towards i.e. controlling mechanisms measuring impact	Participative Teamwork
	Ability to change perspectives	Realise and develop potentials/ capabilities	Work/deal with emotions	Strategic acting towards establishing a learning culture and transforming failures and success into learning	Integrative Leadership
			Deal with contradictions & dilemmas	Management competencies to implement sustainability transitions	Transdisciplinary communication skills

FIGURE 2: COMPETENCIES FOR SUSTAINABILITY-DRIVEN ENTREPRENEURSHIP (LINTNER ET AL., 2016)

1.3 The process and multi-stakeholder approach of WP 3 & WP 4

The contents and methods for the master program were assessed in a participative multi-stakeholder network process. Figure 3 shows the activities and sources of the multi-stakeholder process. The sequence represents the increasing intensity and concreteness of the feedback that was used to develop the modules for the master program.

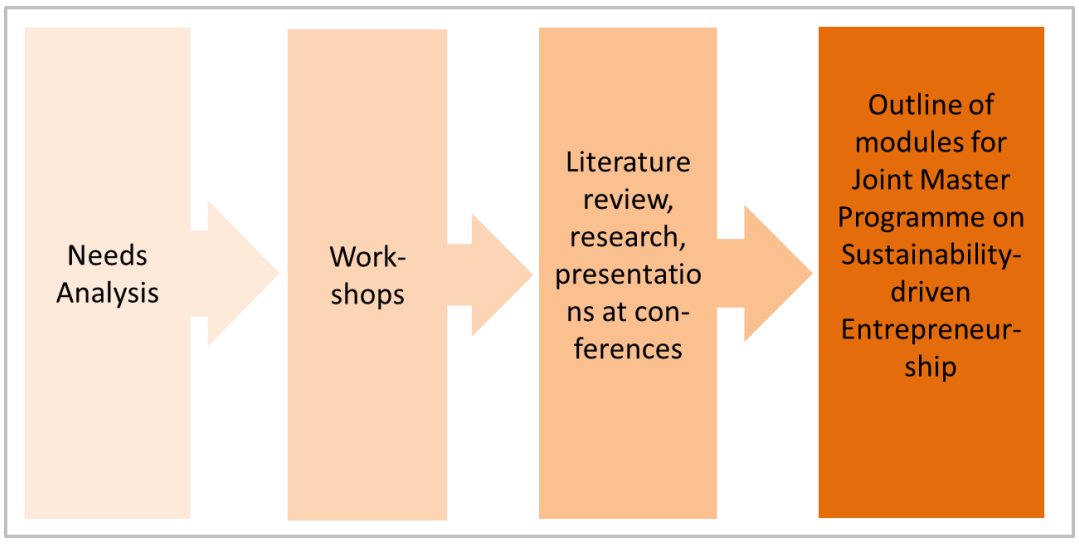

FIGURE 3: SOURCES CONTRIBUTING TO THE DEVELOPMENT OF THE MASTER PROGRAM

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First suggestions concerning relevant topics and adequate teaching and learning methods for the master program were made by interviewees – 48 company partners and 25 university partners – of the needs analysis within the CASE project (Bernhardt et al., 2015). They already formed a basis for the development of the modules. In WP 3 and WP 4 several workshops have been held in different regions. We identified regional actors (especially business partners), partners from HEIs and students as relevant stakeholder-groups for the master program. Participants were chosen based on their potential involvement or experience from existing or past cooperation e.g. service-learning project partners or students from similar study programs. The objective of the process was to build on existing cooperation and establish an even stronger interlinkage between local, regional and transnational partners aiming to support a multi-stakeholder network where the CASE master can be built on. Additionally, we researched and reviewed suggestions in scientific literature concerning content in WP 3 and methods in WP 4. All inputs were analyzed and discussed by members of the CASE team in terms of a participatory discussion culture between researchers, teachers and business partners. The first two workshops in WP 3 and WP 4 were designed to complement the suggestions of the needs analysis. The third and fourth workshops were designed as "real-life checks" to get concrete and concise feedback for the first drafts of the master program and its modules. The last workshop (WP 8) was intended for a final evaluation of the outline of the master program by the CASE team. Figure 4 is an overview of the workshop sequence and the participating stakeholders. Following, the workshops are described in more detail concerning its aims, participants and design.

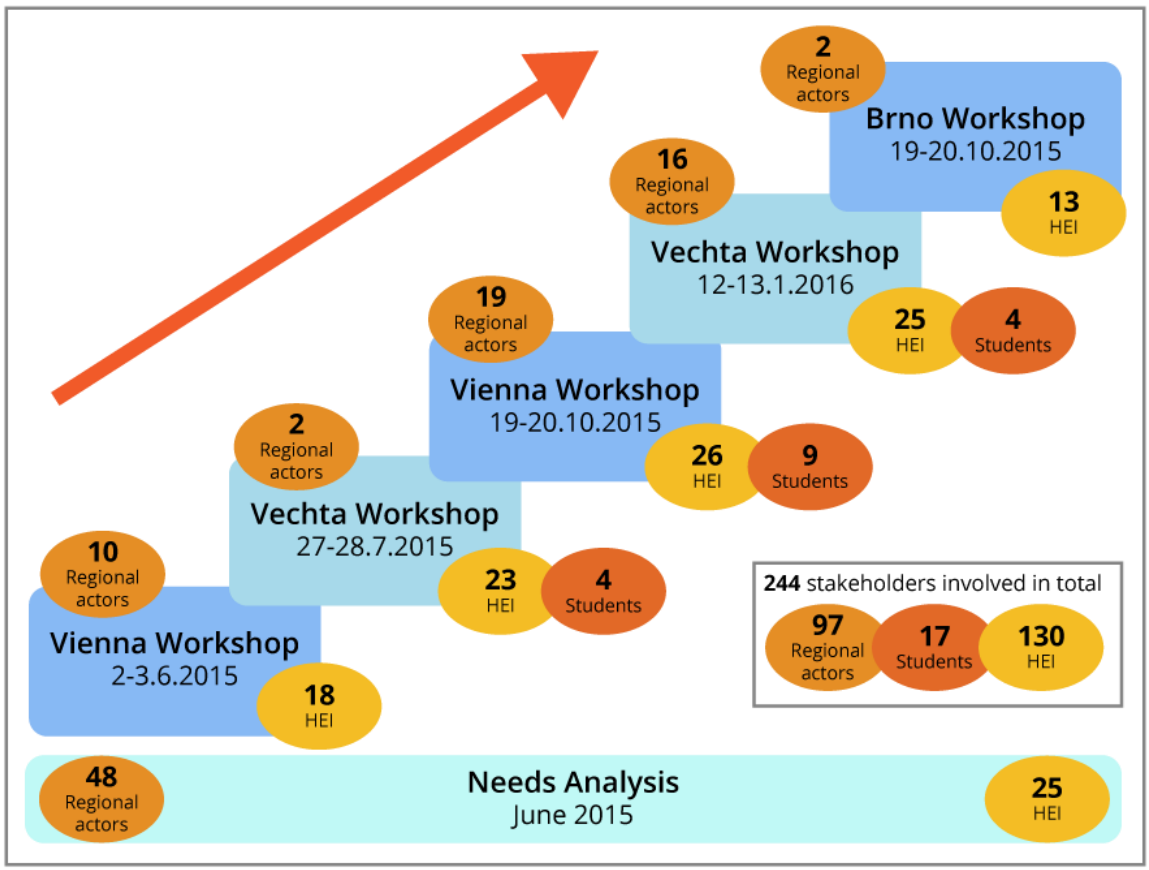

FIGURE 4: MULTI-STAKEHOLDER APPROACH OF WP 3 & WP 4

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The **first workshop** (WP 3) 2nd-3rd June 2015 was hosted at the Vienna University of Economics and Business. 28 participants from different businesses such as R.U.S.Z., Weitsicht OG or Wiener Stadtwerke, business representatives from the Economic Chamber, EcoBusinessPlan Vienna, business incubators e.g. INiTS but also NGOs such as Global 2000 and university partners from Brno, Vechta, Bolzano and Vienna also beyond the CASE consortium contributed actively to the workshop which concentrated on collecting further and more specific input for relevant concepts of competencies, contents and methods for the four proposed thematic fields relevant for the master program:

1. *Sustainable socio-economic development*
2. *Sustainability-driven enterprises*
3. *Eco innovations and environmental management*
4. *Environmental policies and networks*

The first workshop day focused on discussing the following four topics connected to the first and the fourth thematic field identified as particularly relevant in the needs analysis: responsible economy, transformation of the economy, networks and multi-stakeholder networks and new institutional settings. The second workshop day focused in general on the second thematic field and in particular on discussing results and competence fields of the needs analysis relevant to entrepreneurial skills for sustainability-driven enterprises. Both workshop days used creative brainstorming with the help of the methodkit for sustainable development (MethodKit) and joint idea development in a heterogeneous group with participants from universities and business. The world café method provided space for all participants to base discussions on their personal experiences. Partners from the CASE consortium were responsible as table moderators to coordinate, summarize and conclude the discussions in smaller groups. Coffee and small snacks provided by the hosts also encouraged participants to feel comfortable and to network. (see Report and Impressions CASE multi-stakeholder workshop 2-3.6.2015)

The **second workshop** (WP 4), on the 27th and 28th of July 2015, held at the University of Vechta, focused on competence-oriented teaching practices in the field of sustainability-driven entrepreneurship. The first day of the workshop was spent to analyze and discuss the outcomes of the Needs Analysis (WP 1) concerning competencies that should be fostered. The second day of the workshop was designed as a first knowledge exchange for lecturers. In addition to the CASE consortium members, teachers from the University of Vechta, the University of Bremen (Germany), the University of Kiel (Germany) as well as two teachers and two students from Colombia and Ecuador participated. All guests were involved in higher education for sustainable development, entrepreneurship education or competence-oriented teaching in higher education. The first workshop part was facilitated by Prof. Georg Müller-Christ, professor for sustainable management at the University of Bremen and speaker for the network 'higher education and sustainability' of the Global Action Programme ESD. He introduced constellation work as a method that enables learners to experience system dynamics and tensions in groups as well as in sustainability and sustainable management. The method also included a short introduction round. All were invited to participate in an interactive constellation work of the CASE project. The method was highly appreciated by the participants. The second part started with a short introduction to competence-oriented teaching and learning by Prof. Marco Rieckmann. Following, the participants presented each other experiences of good teaching practices. Discussions elaborated what competencies are developed through the presented method and how the teaching examples might fit to the CASE master program on sustainability-driven entrepreneurship. The workshop finished with a short debriefing session. (see Report CASE Workshop 3: Program, Presentation and Impressions of the CASE Workshop 27-28.7.2015)

In the **third workshop** (WP 3) on the 20th of October 2015 a first thematic outline of the CASE master program and relevant modules was presented and discussed with 41 participants from all relevant

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stakeholder groups (students, partners from universities and regional actors) which play a leading role and have experience in the field of sustainability-driven entrepreneurship. The workshop was hosted by the Wiener Stadtwerke Holding AG and moderated by Sylvia Brenzel head of Plenum GmbH who aims to combine sustainability with company success and uses corporate sustainability as an important guiding instrument for whole corporations. The CASE team first introduced the project and outlined contents for the four thematic fields mentioned above to all workshop participants. Afterwards participants were invited to discuss in small, heterogeneous groups. A table order visible through different colors on name badges was prepared for the workshop to mix all three stakeholder groups and to foster heterogeneous discussions about the modules. Each group intensively discussed one thematic field. The CASE members acting as table moderators collected comments, feedback, questions and further ideas concerning competencies, contents and methods for the master program. The first session focused on particular contents and approaches in order to foster competencies in sustainability-driven entrepreneurship whereas the second session focused on the proposed CASE modules and their focus.

During the workshop the dialogue between companies, universities and students was supported via open discussions as well as networking opportunities during the workshop and afterwards. Ideas, motivations and success stories were presented and shared between sustainability-driven entrepreneurs such the founders of Talentify.me, Insettos, Die Netzwerkerin, BOKU Startup Collective Energy, Resonanz or Melange C Sustainable Consulting. Students participated from various different disciplines such as Socioeconomy, Educational science, Socio-ecological economics and policies, Political Science or Social Design, Arts as Urban Innovation. Further participants came from the Austrian Federal Ministry of Science, Research and Economy; the Entrepreneurship Centre Network a platform for interdisciplinary networking and promoting entrepreneurship at university level; the Social Entrepreneurship Centre at the Vienna University of Economics and Business (WU Vienna), and other university and business partners from all five regions of the CASE project.
In the afternoon of the workshop day, the CASE team worked internally on reflecting and developing the feedback of the morning workshop. A particular focus was the development of the modules. (see Invitation, protocol and impressions from the CASE multi-stakeholder workshop 20.10.2015)

The **fourth workshop** (WP 4) lasted two days, 12th and 13th of January 2016 – again held at the University of Vechta, and was split concerning its participants and contents. We engaged Dominique Pannke as a recommended facilitator for the two days. Her work started two month before the workshop took place, so that she could really understand the needs of all CASE members for the workshop and tailor it accordingly.

On the first workshop day the draft version of the master program (CASE Masterdraft handout) was presented and discussed. The draft specified courses for related contents with teaching formats, teaching methods and credit points. In the morning, only the CASE consortium members were present to have a deep discussion and reflection of the aims and the process of the CASE project and to collect all comments concerning the draft. For the afternoon members of the relevant stakeholder groups (teachers, students and local actors) had been invited. In total, 35 people participated. All had been invited for a joint lunch as an informal start. Afterwards, Dominique Pannke facilitated a short introduction round, Prof. Marco Rieckmann introduced the guests to the CASE project and Juliette Braun, responsible for the economic development of the City of Vechta, gave an overview of the regional economic context. The draft of the master program was presented and then, for a deeper discussion, the guests worked in small groups. The guests were asked to join groups according to their status as a student, teacher or regional actor. The groups were asked to comment and feedback the draft version guided by questions tailored for each status group. The questions focused on the overall structure, aspects of implementation and the attractiveness to study/ lecture/cooperate in the CASE master program. Concluding the workshop, all groups summarized their results.

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On the second workshop day, the CASE team worked on the feedback of the previous day. Of special interest were the insights gained about attractive cooperation formats as well as teachers' needs for capacity building in order to teach modules of the CASE master program. The discussions and activities also served as the start of piloting cooperation formats and modules in WP 5 and WP 6. (see Report CASE multi-stakeholder workshop 12-13.1.2016)

In a **fifth, workshop** (WP 8) from the 15th-16th of March 2016 at the Kapral's Mill near Brno the CASE team reflected on the interim results for the master program and intensively discussed aspects of implementation that should be considered within the draft version of the master program (like mobility semesters, credit points, time for specialization and internships). The result of this workshop is the outline of the modules for the master program presented in the result section of this report. (see Program and Impressions CASE Workshop, 15-16.3.2016)

- In general we recommend that WP 5 and especially WP 6 should build on the network in between various stakeholders established via the workshops of WP 3 and WP 4.
- Further activities are recommended to upscale the regional and transnational network in between universities and business partners already established in CASE in order to increase its impacts.
- Upscaling can be focused from horizontal (at the same hierarchical level) and vertical (at higher hierarchical levels) scaling processes.
    - Scaling in horizontal processes refers to activities such as engaging new partners and networks through applying current activities in new contexts or, for instance, through expanding current initiatives in order to reach new target groups or address new topics (e.g. via testing different CASE modules and new course settings)
    - Scaling in vertical processes focusses on global strategies (such as UNESCO, 2014) and initiatives that can be implemented and can have an effect at the local level; and vice-versa on local and regional initiatives that can have an impact at higher hierarchical levels i.e. through institutionalization of science-society interfaces (Biberhofer and Rammel, 2017) or policy activities that consequently lead to structural changes towards sustainable development.
- In particular we recommend that WP 5 and WP 6 should consider possible scaling opportunities during the assessment of effective strategies for and in cooperation between universities and companies in the field of sustainability-driven entrepreneurship.
- Investing in long-term synergies in between universities and businesses is seen to be of special relevance in order to sustain the outcomes and impact of CASE even beyond the life-time of the project.

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2. WP 3: Analysis of master program content

2.1 Tasks and objectives of WP 3

WP 3 has dealt with sustainable socio-economic development and the emerging sector of sustainability-driven business, covering "green", social and sustainable enterprises and non-profit organizations. The aim was to figure out the innovative potential of this emerging sector but also to learn more about the existing challenges. As mind-sets influence the perspectives of global and regional developments and how entrepreneurs perceive challenges but chances as well, the discussion in chapter 2.1.2 below emphasizes on mind-sets and motivations of sustainability-driven entrepreneurs. The second main aim, to define the content of further teaching modules, in order to address existing challenges in the most effective way, is elaborated in chapter 2.1.3 as a summary of the most important outcomes and recommendations on relevant content areas. Figure 5 lists all content areas divided into 6 thematic blocks. WP 3 as such focused on developing and defining the elements of those six thematic blocks as a basic framework of the 2-year new Joint Master Program on "Sustainability-driven Entrepreneurship".

Thematic blocks
1 Sustainable socio-economic development
2 Sustainable and social innovation
3 Sustainability-driven enterprises
4 Sustainable institutional settings and multi-stakeholder networks
5 Personal Development and Coaching
6 Individual focus area for specialization

FIGURE 5: SIX THEMATIC BLOCKS OF THE MASTER PROGRAM

Task 3.1 the development of master program content 1 focused on two particular areas "sustainable socio-economic development" and "environmental policies and networks". The task was carried out between the lead partner of WP 3 WU Vienna and other key partners such as the Free University of Bolzano, the University of Vechta, the Masaryk University, the Terra Institute, the University of Life Science and Natural Resources, Vienna and the Environment Center Kapraluv. Everyone contributed with material and texts for developing appropriate contents for the master program. Special attention was devoted to the macro-level of a sustainable or green economy. Content 1 is reflected in chapter 2.1.3 in the description of thematic block 1 *sustainable socio-economic development* and thematic block 4 *sustainable institutional settings and networks* (Figure 5).

Task 3.3 the development of master program content 2 "entrepreneurial skills for sustainability-driven enterprises" and "Eco innovation and environmental management" was worked out between all partners as they contributed with material and texts for developing appropriate contents for the master program. Special attention was devoted to the micro-level of a sustainable or green economy. As such content 2 is covered in the description of thematic block 2 *sustainable and social innovation* and 3 *sustainability-driven enterprises* in chapter 2.1.3 of this report. Based on the experience gained during the workshops conducted in WP3 and WP4 thematic block 5 *Personal development and coaching* was developed and provides a "bracket" for all other thematic blocks. It emphasizes on the facilitation of learning processes, with the help

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of a mentoring and coaching system, and particularly focuses on reflection exercises, connected to the development of sustainability-driven entrepreneurial competencies and mind-sets, as the core aim of the master program. Thematic block 6 emphasizes the possibility to learn from various contexts via choosing an *Individual focus area for specialization* in the master program.

For both tasks 3.1 and 3.3 the diversity and different expertise of the partners involved provided a comprehensive pool of knowledge to tackle successfully the obligatory diversity of contents. Modules of existing master curricula functioned as a basis in terms of curricula development and pilot creation. The content development was strongly based on the results of WP 1 (Bernhard et al. 2015).

Task 3.2 and Task 3.4 contained the preparation and implementation of four European partner workshops (explained in detail in chapter 1.3) on content of the joint master and were applied to systematically collect and analyze the innovative knowledge generated during the United Nations Decade on Education for Sustainable Development (UN-DESD) and by the KA partners. The enterprise partners of the KA, like the Terra Institute or the Wiener Stadtwerke Holding took a key role in preparing and conducting workshops. Additional experts from the economic sector as well as associate partners were invited to these workshops and contributed in terms of experience and knowledge exchange. Chapter 1.3 elaborates in detail on the process and multi-stakeholder approach applied in WP 3.

Task 3.5 was the assessment of master program contents as preparation for the regional pilots. Therefore the particular socio-economic context of each KA partner was taken into account as well as the different regional enterprise partners involved in order to create a solid basis for the regional pilots to be tested in WP 6. In the course of task 3.5 the contents created in task 3.1, 3.2, 3.3 and 3.4 were analyzed and are summarized in chapter 2.3 as well as chapter 4 of this report.

This report represents deliverable 3.1 an assessment report of master program contents 1 & 2. Monitoring and evaluation of the work undertaken within WP 3 was also part of WP 8 were the Masaryk University provided quality assurance measures for D3.1 (Činčera et al., 2015a). Performance indicators of WP 3 were linked to results of the needs analysis (Bernhardt et al., 2015) and WP 8 especially to the first quality assessment report (Činčera et al., 2015b) and the first evaluation report of the CASE project (Činčera et al., 2016).

Associate partners such as United Nations University Institute for the Advanced Study of Sustainability, the Austrian Federal Ministry of Science, Research and Economy, the University of Valencia, the University of St. Gallen, Socionext, Pegasus Business Key and The Arizona State University and many other partners from relevant stakeholder groups – in total 97 regional actors especially business partners and 130 university partners – participated in WP3 via providing experience and knowledge within the field of content generation for the modules.

Consequently, WP 3 has not only developed relevant fields of content for the master program but has helped to establish a broad network in between universities and business partners as a base of the implementation of the modules and the master program developed in the CASE project. As such it has laid the foundations to foster effective strategies in cooperation between universities and companies in the field of sustainability-driven entrepreneurship for WP 5 and WP 6.

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2.2 Innovative potential and challenges in the emerging sector of sustainability-driven business

Understanding the mind-sets of sustainability-driven entrepreneurs

The international discourse about new types of economic activity increasingly acknowledges sustainable enterprises or sustainability-oriented entrepreneurs as agents of change towards a post-growth society (Parrish and Foxon, 2009; Kyrö, 2015). Their primary focus on social and environmental values reflects a radical transformation of our present understanding of the economy and the current patterns of production and consumption. Their potential to create solutions for multiple challenges manifested in the ecological, social, political and financial crises (WBGU, 2011) is deeply connected with their mind-sets which are open for creating change and transformation processes. In this respect the concept of sustainability-driven entrepreneurship is of global interest and understood as the ambition to re-conceptualize the economy towards an embedded understanding of an entrepreneur (Polanyi, 1979), its business idea, motivation and action. As such sustainability-driven entrepreneurship asks for different kinds of mind-sets compared to conventional entrepreneurship, which objectives are often profit-driven, exponentially growth-oriented and satisfying material wants. The economic dimension in sustainability-driven entrepreneurship is perceived primarily as embedded in a social, ecological and cultural context. Sustainability-driven entrepreneurship meets ecological and social challenges simultaneously with regard to both purpose and process.

Even if sustainability-driven entrepreneurs are driven by sustainability values, they act in an area of conflict. Implementing sustainability means for them to be aware of the contradictions, dilemmas and trade-offs, especially occurring from economic necessities. But it also means to set up a culture of learning and innovation in order to foster an integrated view of sustainability. In the following section seven criteria are described which characterize these mind-sets but open the discussion about challenges and conflicts as well.

Key characteristics of mind-sets

Sustainability-driven entrepreneurs not only regard the three dimensions of sustainability as exchangeable pillars, but mostly as a triangular relationship. *Keeping the balance* within these three dimensions is considered as a first criterion of sustainability-driven entrepreneurs' mind-sets (see Figure 6). Sustainability-driven entrepreneurs are highly aware of the difficulties in keeping the balance, as the economic realities often demand for prioritizing economic decisions. This is due to the fact that sustainability-driven entrepreneurs do not act in a societal and economic vacuum (Granovetter, 1990), but that their sustainability-oriented action is still embedded in a rather capitalistic and exponentially growth-oriented economic context which sets limitations to a facile implementation of an alternative economic action (Stagl, 2013).

Key characteristics of sustainability-driven entrepreneurs' mind-sets

1) Balancing the three dimensions of sustainability
2) Long-term orientation
3) Intergenerational thinking
4) Critical attitude towards individualism, competitiveness and growth perspective
5) Well-being/living good lives
6) Value orientation
7) Circular-thinking

FIGURE 6: KEY CHARACTERISTICS OF SUSTAINABILITY-DRIVEN ENTREPRENEURS' MIND-SETS (LINTNER ET AL., 2016)

The second criterion, *long-term orientation* is connected to the ecological dimension of sustainability, in particular to the efficient distribution of natural resources and the receipt of the natural environment by avoiding ecosystem degradation (reducing

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pollutants, waste, and emissions). This is linked to a critical perspective towards conventional economic strategies which conceptualize the economy as a separate sphere from other social or environmental processes.

Intergenerational thinking as a third criterion means, following the Brundtland Report (1987), to act in a way that future generations will find equal conditions to live. Equal conditions are linked to different dimensions of sustainability e.g. the promotion of social equality or democracy. The idea is to save ecological and cultural resources in order to allow future generations to live a good life, as they should have the same rights as the present ones, independently from which political, economic, social and geographical background they come from. The challenge is to find the balance between protection and preservation of the present status quo and to remain open for innovation and future-oriented thinking. Nevertheless, protection-oriented thinking is related to the risk that it can easily turn into social and cultural partitioning and exclusion, as the reaction to actual transformation processes like migration, border politics and resource conflicts show.

The fourth criterion *criticizes certain values connected with mainstream entrepreneurs*, such as individualism, self-reliance, selfishness, free individual choice, competitiveness etc. Sustainability-driven entrepreneurs question the general assumption of the economic growth perspective that development can be reached only by adopting a better and faster growth perspective. Entrepreneurial goals are interconnected with the focus on new forms of cooperation. In particular this idea is reflected in emerging cooperative socio-economic structures, in networks as well as in local economies. Economic activity, seen from this perspective is about quality of life, about the fair distribution of values created, about a self-determined life and the relationship with nature.

The fifth criterion of *wellbeing/living good lives* is closely related to the concept of having meaningful jobs (Parrish, 2010). A theoretical paradigm, which discusses the wellbeing of people, represents the capability approach. In contrast to the dominant economic approaches, it starts by referring to the equal dignity of all people, whatever their class, religion, caste, race or gender (Nussbaum, 2010; Sen, 2005).

A sixth criterion is *value orientation* and reflects on the concept of a sustainable economy being very much linked to doing business in a responsible and honest way (Gagnon, 2012). The traditional codex of the “honorable businessman” celebrates a rebirth. Non-economic goals are decisive to the differentiation between ‘traditional’ entrepreneurs and sustainability-driven entrepreneurs. They embody greater consideration to not only transform either sustainable products and/or processes they create profitable enterprises, while achieving specific environmental and social objectives.

The seventh and last identified criterion, *circular-thinking*, focuses on global and regional interlinkages. As such high-profile global processes are focused aiming to unite action to address sustainability challenges at a global level. However, in order to be effective, these global initiatives need to be connected to local aims, debates and transformative actions. Indeed, the interviews reflect a great need for economic transformation in all regions. That evokes transformation processes regarding different stakeholders and creates a certain pressure even towards regional governments to set up appropriate projects.

These interrelated characteristics constitute the mind-sets of sustainability-driven entrepreneurs and set the preconditions concerning a career transition towards sustainability-driven entrepreneurship which is motivated by different motivational driving forces. A personal, a societal and an institutional motivation cluster were distinguished in the needs analysis (Bernhardt et al., 2015).

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2.3 Learnings and recommendations on relevant content areas

Based on the findings presented in chapter 2.1.2 and further insights from companies, university partners and students participating at workshops conducted in WP 3 (see chapter 1.3) a great content-pool was generated and provides the basis for developing the modules. Suggested quality criteria in WP 7 helped us to structure an intensive research effort on good practice examples, state of the art concerning relevant content areas on sustainability-driven entrepreneurship as well as experience and knowledge from practice partners. Within this process, the proposed content areas (see chapter 2.1.1) were specified. In the following we present the framework and the basic elements of the new Joint Master Program on "Sustainability-driven Entrepreneurship" for European universities, its six thematic blocks (Figure 5) and 16 corresponding modules (Figure 7). In chapter 2.2 all thematic blocks and related modules are described starting with thematic block 1 *Sustainable socio-economic development* that contains 3 modules 1.1 Transformation and Sustainabiltiy, 1.2 Sustainable Economy and 1.3 Interactions in multi-scales. Figure 7 shows and overview of all six thematic blocks and 16 modules of the master program. In the following the content of the thematic blocks and modules are described as a first step. Additionally in chapter 4 of this report (p. 68f.) all modules contents are summarized in combination with the outcomes of WP 4, which are beyond others, recommended course formats, main pedagogical approaches, teaching methods and suggested assessment of the modules.

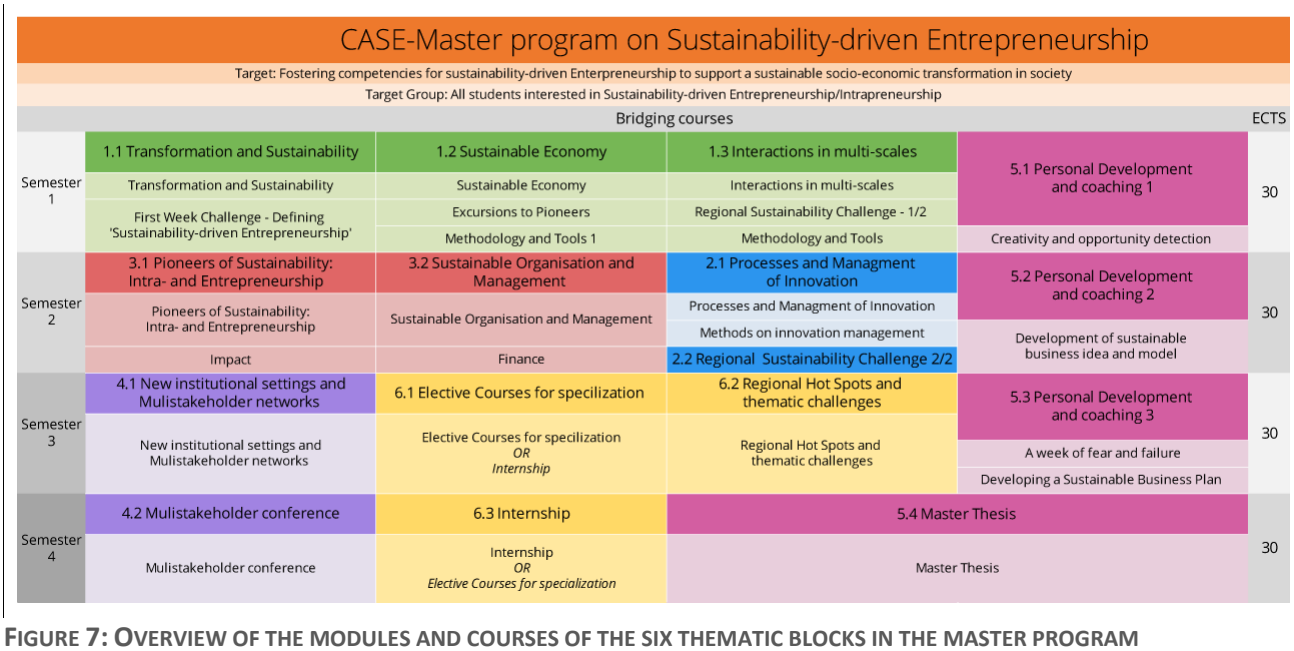

FIGURE 7: OVERVIEW OF THE MODULES AND COURSES OF THE SIX THEMATIC BLOCKS IN THE MASTER PROGRAM

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2.4 Thematic blocks in the master program

2.4.1 Thematic Block 1: Sustainable socio-economic development

***Key question**: Why do we need sustainability-driven entrepreneurship?*

Aim of thematic block 1:

- Become familiar with grand challenges indicated e.g. in the United Nations Development Program Sustainable Development Goals (UNDP-SDGs) indicated in Figure 9 (UNDP, 2016a) to which the entrepreneur should respond
- Understand the greater context (the imperative) – namely sustainable socio-economic development for sustainability-driven entrepreneurship and dynamics and know theoretical frameworks in order to create change
- Research regional challenges and processes

Thematic block 1 fosters the understanding for the needs of sustainable socio-economic development in order to create change and transform mind-sets towards sustainability-driven entrepreneurs. Mind-sets of people are regarded as the most limiting aspect towards a sustainable socio-economic development (Bernhardt et al., 2015, Lintner et al., 2016). As such the students are motivated to broaden their understanding about the system and likewise the emergence of new perspectives on what an entrepreneur does in encouraged.

Figure 8: The 17 Sustainable Development Goals (UNDP, 2016)

In the beginning concepts of transformation (Scoones et al., 2015; WBGU, 2011; Geels & Schot, 2008) and sustainable development (WCED, 1987; UN, 2002; UNDP, 2016b) as well as environmental and ecological economics (Martinez-Alier, 2009; Spash, 2013), sustainable economy (Constanza et al., 2012), green economy (UNEP, 2011), or degrowth (Asara et al., 2015) are introduced to understand the basics sustainable socio-economic development can be built on. Critical and ethical reflection on the terms introduced is necessary in order to sensitize students' perspectives on current challenges (Brand, 2015a, 2015b, 2012).

Moreover the aim of this thematic block should be to see the world within a bigger picture, to understand the system, power dynamics in economy in order to start thinking outside the box. Important is also the inclusion of gender aspects and feminist economic models, which is based on the perspective of plural economies (Perkins, 2007; Barker and Kuiper, 2003) or diverse economies (Gibson-Graham, 2008).

The key areas identified for the first thematic block *sustainable socio-economic development* are summarized as the first three modules 1.1-1.3 of the master (Figure 8):

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Module 1.1 Transformation and Sustainability

The starting point of module 1.1 should be a first week challenge aiming to define "sustainability-driven entrepreneurship" together with the students and relevant stakeholders of the program. Students will get to know different examples of sustainability-driven entrepreneurs and possible role models (cp. excursions to pioneers as part of module 1.2 below). In general the week shall provide an introduction for the particular inter- and transdisciplinary learning and teaching approach of the master program. Students will get familiar with important concepts of sustainability science and necessary methodological considerations which have to be taken into account from an inter- and transdisciplinary perspective.

After the first week challenge module 1.1 focuses on great transformations in history (Polanyi, 1957 & 1979) and today, transformation processes in general (Scoones et al. 2015) as well as global trends and challenges (UN, 2013) focusing on sustainability as a science (Jackson, 2009; Schneidewind et al. 2016; Komiyama and Takeuchi, 2006; Wiek and Lang, 2016). The general approach of module 1.1 aims at

- Pluralistic approaches towards transition and transformation concepts (Naidoo, 2014; Scoones et al., 2015; Stirling, 2011, 2014, 2015) including a critical reflection process,
- Understanding and learning from history (beyond others Polanyi, 1957 & 1979), different cultures and values (Martinez-Alier, 2009; Escobar, 2011).

Sub questions for module 1.1
What kind of values does a sustainable socio-economic development reflect on? What socio-economic effects do global trends such as climate change, biodiversity loss have on regional level? Transformation of the economy: What shall the transformation of the economy look like (production and consumption system)? What can trigger a transformation process? What roles do bottom-up initiatives, local/regional production cycles (regionalization processes) and community development play in this context?

Module 1.2 Sustainable Economy and alternative economic strategies

In module 1.2 alternative economic strategies and concepts of the economy will be introduced as good practice examples e.g. a circular economy and regional cycles (Andrews, 2015), sharing instead of owing (Schor, 2014; Hamari et al. 2015 or Wagner et al., 2015), the de-growth or post growth movement (Asara et al., 2015; Johanisova et al., 2013; Sekulova et al., 2013; Schneider et al., 2010). The widespread mentality of necessity to growth affects enterprises as well as universities. As such the question of alternative models of growth is raised (Jackson, 2009). The concept and role of a responsible economy (Baumgärtner and Quass, 2010), relevant actors and markets concerning supply and demand as well as the role of niches can be deconstructed via various thematic fields such as ethics and values, common welfare, prosperity, quality of life, responsibility of consumers and producers and resilience (Smith et al., 2010; Markard, 2012; Simmie and Martin, 2009). A critical issue within this model refers to the opinion that economic prosperity is a precondition for sustainable development (Kallis, 2011; Gowdy, 2007). In a world of high instability and latent risk of economic crisis that seems too short sighted.

Thus it would be interesting to investigate, how sustainability-driven entrepreneurship may contribute to a resilient and a circular economy. Normative conflicts and ideological aspects are specific challenges and need

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particular reflection in the context of sustainability-driven enterprises. Economic sustainability seems to be one of the biggest challenges sustainability-driven entrepreneurs are facing when trying to implement their often idealistic visions (Bernhard et al., 2015) and therefore the particular focus of a responsible economy is key for the module. Students should reflect how norms, ethics and other social philosophies influence customer behavior and shape an economy. As such the interrelation between economic development and individual and institutional ethics is focused. The economy is conceptualized as an embedded concept (Polanyi, 1957).

Excursions to Pioneers

To understand the relevance of a sustainable economy and the need of alternative economic strategies students will meet and visit pioneers in the field of sustainability-driven entrepreneurship as part of module 1.2. Likewise the pioneers can be seen as role models, activators who provide real-life feedback via their practical examples. Students shall get to know and learn from various active sustainable entrepreneurs and their approaches. Already in the workshops of WP3 as well as in ongoing service learning projects the CASE team works on establishing a network of sustainability-driven start-ups such as Talentify.me an educational project of the social enterprise talent 2 talent GmbH aiming to establish a sustainable peer-to-peer online platform that helps young people to develop their full potential, regardless of social or financial background of parents. Another example is Collective Energy a start-up who wants to accomplish the goal of community-financed renewable energy projects, and thus drive the energy revolution. But also more established sustainability-driven enterprises are part of the network like the R.U.S.Z., a venture of Sepp Eisenriegler, who promotes socio-ecological values through maintenance and repairing activities of washing machines and other electrical appliances. His activities are widespread, ranging from hosting repair cafés—an attempt at empowering people to fix their appliances at his workshops, with tools and professionals' help at their disposal—to lobbying for legislation needed to introduce a circular economy at European level.

Sub questions for module 1.2
How shall the economy respond to global challenges? What does globalization mean for the economy/companies? What effects does global responsibility towards sustainable societies have on production sides and end consumption?

Methodology and Tools 1

Main parts of the first thematic block are based on the understanding of concepts and therefore need to be combined with a methodology and tools course 1 as part of module 1.2 (Figure 7). In this part of the module students acquire competencies for critical analysis of texts – academic reading – and the creation and presentation of scientific texts – academic writing. The focus should be on critical thinking competencies.

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Module 1.3 Interactions in multi-scales

Further interactions are reflected via a multi-scales perspective, beyond the traditional micro-macro perspective and in a way to overcome such dualism and relate globalization in terms of grand challenges (multiple crises, differences, value chains) to regionalization processes such as sustainable regional-, urban-, rural- and community development or regional cycles/cycle economies. The implementation of transformative concepts on local entrepreneurial level and its effects on the global scale shall help students to bridge a dualistic perspective and to interlink various scales and their effects on each other. The module helps students to understand that regional action has an effect on the global scale. In particular this module aims at bridging theory and practice in the context of socio-ecological transformation. Students are encouraged to use their creativity, experiences and knowledge in order to develop their own particular transformation project in the regional context and create solutions for regional sustainability challenges. The project shall have an interdisciplinary fundament in theoretical perspective and shall work within a science-society interface in practical terms. The transmission and persistence of a progressive approach to socio-ecological transformation shall be achieved and enhanced via dynamic stakeholder dialogues, opening as well as enabling of public discourses on transforming socio-ecological relations, emergence of novel micro-meso institutions as well as education for sustainable development.

The module will deconstruct a holistic understanding of socio-ecological transformation in its economic, ecological, social, cultural and political spheres in practice. It offers students the opportunity to understand different perspectives of sustainability via an experience based learning approach in service-learning projects. Together with partners from practice (e.g. businesses, non-profit organizations, city departments) projects are designed and create solution concepts for practical challenges of the partners working environment.

Sub question for module 1.3

How can we overcome the dilemma globalization – regionalization?

Methodology and Tools 2

Module 1.3 should also be combined with a methodology and tools 2 course focusing on tutoring and coaching for project management, research tools from sustainability science and methodology of social science from an inter- and transdisciplinary perspective. Students will learn about theoretical methodological principles of sustainability science and will also get introduced to information on the logic and strategy of empirical exploration, methods and techniques of data collection. Essential elements such as conceptualization, measurement, causality and research design are treated, but also challenges and methodological problems will be discussed. Different forms of qualitative and quantitative research methods will be introduced, methodological underpinnings and possible combinations of quantitative and qualitative approaches. The aim of the course is to contribute to the ability of students to define their own research project/service-learning project.

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2.4.2 Thematic Block 2: Social and sustainable innovation

***Key question**: What is at the core of sustainable innovation and improvement? How to translate innovations into the settings of sustainability-driven enterprises?*

Aim of thematic block 2:

- Understand the difference about change and improvement connected with the theoretical framework of disruptive or path-breaking innovation vs. incremental change and innovation
- Emphasize the complexity of the process of generating something new and sustainable in the socio-economic context – windows of opportunity
- Foster core understanding of sustainable innovation and how to use it in the entrepreneurial context
- Handle traditional aspects of eco-efficiency (linkage to the mainstream) and beyond
- Find solutions for challenges faced by enterprises and entrepreneurs on their sustainability mission

The CASE needs analysis (Bernhard et al., 2015) highlighted that social and sustainable innovation are often used as keywords, linked with high expectations on future development and economic profits. For this thematic block we emphasize the necessity to have a deeper understanding of social and sustainability-oriented innovations via connecting the ongoing research process of the students with good practice examples. The purpose of this thematic block is that students leave their own territories and thinking islands permanently in order to be innovative and creative. We will highlight the high importance and challenges of innovation management via testing of various innovation-based methods such as “processes of co-creation of knowledge” and “open spaces”. Start-up hubs and co-working spaces will be active partners to create and foster communication between students studying at different universities of the joint master program.

Module 2.1 Processes and Management of Sustainability Innovation

In the beginning of module 2 an introduction of the core understandings of innovation management (Dodgson, 2014) and in particular sustainability-oriented innovation (Schaltegger et al., 2011) are provided from an interdisciplinary theoretical (Howaldt, 2014) and historical perspective (Schumpeter, 1912; Ogburn, 1966). Concepts such as social-, eco- and institutional innovation as well as their interlinkages to sustainability-driven start-ups are analyzed (Schaltegger et al., 2011; Mulgan, 2012). As this is quite a new field, the main focus will be on individual pioneers and their values, goals, motivations and skills (as briefly introduced in chapter 2.1.2 above). Students will learn from potential role-models and their business models, which are based on particular mind-sets and values, guiding an innovative process in order to find entrepreneurial solutions to societal problems.

In general, this module asks for a practical approach fostering creativity as sustainability-driven entrepreneurship is in essence the realization of sustainability innovations (societal, environmental and institutional) aimed at the mass market and providing benefit to the larger part of society (Schaltegger et al. 2011). In particular, this module will emphasize the understanding and testing of methods on sustainability innovation management in practice. Sustainability innovations, seen as the recombination of existing ideas in new and novel ways, will be of interest, but also actual innovations, which are not only a recombination. Practical examples will help students to understand the difference between change and improvement connected with the theoretical framework of disruptive or path-breaking innovation vs. incremental change and innovation.

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Since we don't expect all students to be an entrepreneur after graduating from the master program the aspects of intrapreneurs, who learn and create innovations and substantial change inside/from within a company, is also considered. From this perspective graduates will learn about potentials of transforming particular sectors and helping to change branches as important actors of change management for enterprises and society.

Sub questions for module 2.1

What is innovation management? What does an ideal innovation process look like? What kind of innovation management methods exist? What is supporting innovation and innovators?

Module 2.2 Regional Sustainability Challenge

Module 2.2 is aiming at the concrete implementation of service-learning project concepts designed and developed in module 1.3. (see above). Students are encouraged to bring their own service-learning project to life in the regional context. Based on the learning outcomes of the prior phases of project development and related stakeholder feedback, students will face the opportunities of a transdisciplinary learning environment and will have to tackle "real life problems" of interactions between science and society.

Sub questions for module 2.2

How to implement regional solution concepts for sustainability challenges? How to create change and tackle real life problems of regional stakeholders?

2.4.3 Thematic Block 3: Sustainability-driven enterprises

***Key questions**: How do we tackle sustainability challenges as entrepreneurs? What characterizes sustainability-driven entrepreneurship?*

Aim of thematic block 3:

- Understanding the core of sustainability-driven entrepreneurship
- Understanding the difference between intra- and entrepreneurship and according cultural differences between established enterprises and start-ups
- Learning from good practices and failures of pioneers
- Understanding the difference between sustainability-driven enterprises and corporate social responsibility (CSR) in companies
- Learning the technical tools and skills for developing a business plan
- Building an understanding of how sustainability-driven enterprises develop and function

Module 3.1 Pioneers of Sustainability and Impact

Pioneers of Sustainability are personalities who proactively approach sustainability challenges. Depending on their environment of activity, intra- and entrepreneurs play an essential role in transformation towards a

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sustainable development (Tilley and Young, 2009; Hockerts & Wüstenhagen, 2010). Within this module intrapreneurs – having pushed change in a business unit or a whole established company – and entrepreneurs – having started their own business – are portrayed. Learning from their success and failure stories, about specific challenges and opportunities of sustainability-driven entrepreneurs is equally exciting and helpful.

A sustainability-driven enterprise incorporates sustainability in its business model at all levels (Parrish, 2010). Taking this into consideration, the technical business competencies are conveyed including fundamental aspects of sustainability. The concepts of circular economy and life cycle assessment are just examples of how product and service development is approached in a holistic way (Fichter & Tiemann, 2015; Joyce et al., 2015). Particular focus on ecological and social aspects is also laid in green logistics and ethical marketing (Jabbour and Sousa Jabbour, 2016). In this context, a critical view on CSR (corporate social responsibility) differentiates between "greenwashing" and substantial integration of sustainability criteria into the core business (Schaltegger and Wagner, 2011).

Social and ecological impact-maximization is a core orientation of sustainability-driven entrepreneurial activities, contrary to the widespread maximization of profit (Boons & Lüdeke-Freund, 2013). In addition to operational costs of the business, external effects are taken into account and therefore require the evaluation of eco-social costs and benefits. Besides measuring the values, this module also demonstrates strategies on how to deal with them. For example, carbon dioxide emissions should preferably be avoided and only alternatively be compensated. Becoming a sustainable enterprise is a continuous process, making controlling and benchmarking indispensable tools.

The impact of the business activities on affected stakeholder groups and the consequences on relations are discussed within thematic block 4 on institutional settings and multi-stakeholder networks.

Sub questions for module 3.1

What can we learn from pioneers of sustainability? What is the difference between sustainability-driven entrepreneurship and CSR? What is the impact of the business activity and how can it be dealt with?

Module 3.2 Sustainable Organization & Management and Finance

Sustainable Organization and Management requires a careful choice of legal and organizational forms according to the needs. As participative processes and common ownership are popular elements of integrating specific stakeholder groups, the chosen forms ideally reflect these and equip the enterprise with the necessary framework. Complementary to an extensive overview on legal forms including cooperatives and associations, this module opens different perspectives on their aspects. As an example, shareholders of a limited company are not only participating in profits and losses but they are bearing responsibility as co-owners of the company. A sustainable organization is based on sustainable human resources management. The introduction into organizational structures focusses on transparency, participative decision processes and ownership of stakeholders, especially employees (Graeme et al., 2016). A similar approach applies to management of projects, processes and change in general. The attention to humans and their individual roles is of equal importance as result-orientation.

Finance is a crucial element in every business model. Therefore learning the basics of accounting, controlling and risk management is the core part of this module. In the context of sustainability-driven enterprises, funding implicates other motivations to invest than making profit. Some investors take eco-social impact into

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consideration; others are directly related to the company as stakeholders, e.g. customers or suppliers. This generates interest for appropriate fund raising models, such as crowdfunding, hybrid financial models or partnerships (Valančienė and Jegelevičiūtė, 2014).

The design and setup of a sustainability-driven start-up will be covered in thematic block 5, where an individual business model and plan are developed.

Sub questions for module 3.2

How can an organization be structured and managed to operate in a sustainable way? What are the possible financing models of a sustainability-driven enterprise?

2.4.4 Thematic Block 4: Sustainable institutional settings and multi-stakeholder networks

***Key questions**: What is influencing the evolution of sustainability-driven start-ups? How can the dynamic of institutional settings and multi-stakeholder networks be used by sustainability-driven entrepreneurs?*

Aim of thematic block 4:

- Understanding dynamics where sustainable change is embedded
- Understanding how to shape this adaptive landscape
- Learn how to transform institutional settings
- Learn from and use working approaches of multi-stakeholder networks
- Create innovative spaces to facilitate interactions and relationships
- Create partnerships for new markets

Thematic block 4 initially named “environmental policies and networks” is now entitled “sustainable institutional settings and multi-stakeholder networks”. As the environmental perspective is only one relevant sustainability sphere besides the social and economic (Brundtland Report, 1987), we choose a broader title in order to refer to a more holistic perspective sustainability-driven entrepreneurs have to embed their activities in. Further the thematic block reflects not only about various policies and conventional networks but a set of rules, norms, conventions etc. which constitute the institutional setting of sustainability-driven entrepreneurs. The element which distinguishes a stakeholder network from a multi-stakeholder network is partnership, as Rolloff (2008) points out. Further research about networks in the context of sustainability-driven entrepreneurs (Bernhardt et al., 2015) showed that it is necessary to put emphasize on multiple stakeholders.

In short, the thematic block intends to deepen the understanding of dynamic settings where sustainable change is embedded and which shapes the adaptive landscape of sustainability-driven entrepreneurship.

Module 4.1 New institutional settings and multi-stakeholder networks

Module 4.1 deals with new institutional settings e.g. via involving different stakeholder groups and dealing with questions about how political processes have to be designed and can be influenced in order to support democratization fostering sustainable socio-economic development (Clark and Dickson, 2003; Van Kerkhoff and Lebel, 2006; Orecchini et al., 2012). The module introduces innovative deliberative structures and participation processes as well as innovative spaces facilitating interactions and relationship building (see collaborative learning in Lukman et al. 2009, 3; Lozano 2007). In broader terms communication processes in

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society and enterprises are focused and the history and development of institutional settings are of special interest. Partnerships for new markets will be of particular interest as well as knowledge creation processes involving the public sphere.

Sub questions for module 4.1

What kinds of institutions are necessary for a sustainable socio-economic development (i.e. responsible and sustainable universities)? What role do market dynamics play in this context? What kind of governance framework is needed?

Another focus in module 4.1 are multi-stakeholder networks used as practical examples and supporters to push sustainability-driven innovations and business ideas and in particular to build up sustainability networks within and around the university (Shiroyama et al., 2011; Van der Leeuw et al. 2011, 119). Rolloff (2008, 237) defines multi-stakeholder networks as "an organizational structure that allows collective action beyond national boundaries, since the participation is voluntary and objectives and actions are negotiated among participants". In literature they are often labelled as new forms of local and global governance (Bäckstrand, 2006). In relation to sustainability and higher education the cooperation with stakeholders outside academia like companies is seen as fundamental in order to face sustainable socio-economic development and sustainability driven entrepreneurship in particular (Yarime et al., 2012, 101). Examples of such stakeholders and actor constellations are science-society interfaces, cooperation of various sectors or transdisciplinary networks. The module focuses on the working approaches of these networks as well as particular challenges of the settings multi-stakeholder networks are facing. Sometimes they are hyped as solution for all, with too little regard on challenges, caused by diversity of the involved partners as for example different value definitions (Carley and Christie, 2000), different views on relevance and data interpretation (Lozano, 2007, 373) or poor communication. As Roloffs (2007, 243) underlines in her study, "[m]ulti-stakeholder networks have the disadvantage that they are time consuming and often unstable. Although their spontaneity and informality recommends them for urgent and complex issues that cannot be approached by established institutions quickly enough, they are in many cases not able to construct a lasting and comprehensive solution". Such collaboration forms costs, as Genefke (2000, 1) points out not only in economic terms but also in emotional terms. Measures to encounter challenges and barriers are important for this module. Further emphasize and research on practical examples as well as on the question of how to involve enterprises as an active part in research processes, could be of great value. The need for translators/facilitators in such processes, in order to respond to different disciplinary or sectorial cultures and languages, and the possibility that universities could offer such educational/facilitation trainings should be met within the module. Associations and intermediate institutions especially the big, formal associations play an important role in setting standards for such networks in society and economy. The power and the role of these institutions i.e. as multipliers of sustainable socio-economic development are of particular relevance in the module.

Further sub questions for module 4.1

How can multi-stakeholder networks help to improve impact of sustainable entrepreneurs/sustainable socio-economic development? What barriers do they face? How can translation/facilitation barriers in such networks be overcome?

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2.4.5 Thematic Block 5: Personal Development and Coaching

Key questions: *How to establish a support structure and a learning community which helps students to develop their personal sustainability-driven entrepreneurial vision and mission? How to let students critically reflect on course contents "outside the box" of the regular curriculum to integrate them into the personal frames of reference? How to foster personal development of students' entrepreneurial competencies and mind-sets? How to foster the development of sustainability-driven start-ups?*

The thematic block aims:

- Facilitating vision and mission development as well as an ongoing reflection process
- Creating space and opportunities for personal development processes
- Linking students with mentors/role models and building up a career-relevant network
- Supporting students with creating innovative business ideas that tackle sustainability challenges
- Supporting students with developing a coherent business model and plan
- Supporting students with writing a project-based master thesis and evaluating their project

Thematic block 5 is the "bracket" for all other thematic blocks that facilitates all learning processes for the development of sustainability-driven entrepreneurial competencies and mind-sets. It functions as a "box outside" the regular curriculum that offers space and opportunities to reflect on new insights, to integrate the learning processes of different courses, to strengthen the group feeling of the student community and to accompany the personal development as a sustainability-driven entrepreneur. The block strongly aims at transformative learning for personal development.

Module 5.1 Personal development and coaching 1

As such module 5.1 focuses on the process of vision and mission development via settings oriented on critical reflection, role models and (peer) coaching (AtKisson, 1999; Taylor and Cranton, 2012). First, students reflect their starting point: Why have they chosen this master program? What knowledge, skills and competencies do they already have in relation to sustainability-driven entrepreneurship? etc. The next step is to integrate new learning experiences from the first thematic block and its modules into their personal frame and to apply it in an entrepreneurial context. The learning experiences address transformation and sustainability (Tilbury, 2004; Sterling, 2010 or Lange, 2012), and the need for sustainability-driven entrepreneurship in a globally oriented responsible economy (Wiek, 2011; Lans, 2014). To apply this knowledge in the context of sustainability-driven entrepreneurship and to foster entrepreneurial thinking and creativity, students develop various, rough business ideas. They shall learn to work creatively and to differentiate between business opportunities versus personally relevant business opportunities. Bringing all insights from the first semester, the starting motivation and a future perspective together, students shall formulate a personal mission and vision of their future as a sustainability-driven entrepreneur.

In module 5.1 students will also begin to build up their own career-relevant network where they can ask for help, support or advice based on a triangular mentoring model (Figure 9). They look for and get in contact with a personal role

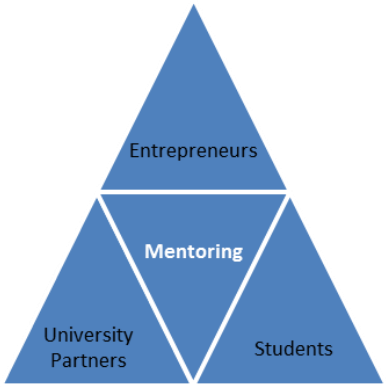

Figure 9: The mentoring triangle of the CASE Master Program

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model for sustainability-driven entrepreneurship and ask him/her to be his or her mentor during the master program (Rigg & O'Dwyer, 2012; Smith & Woodworth, 2012). Students shall also find an academic mentor and will be matched to interdisciplinary tandems for peer support (Olivero, 2014). Consequently every student has at least three contact persons during the master program from different fields of expertise (Figure 9).

Sub questions for module 5.1

How to create a personal vision and mission? How to find a role model which helps students in their personal development process towards a sustainability-driven entrepreneur? What can be learned from mentors?

Module 5.2 Personal development and coaching 2

Module 5.2 accompanies semester two in particular module 3.1 which focuses on basics of sustainability-driven entre- and intrapreneurship, the measuring of impact, module 3.2 organizational management, financing and module 2 emphasizing innovation management. Accordingly, students dive into the real world of businesses when implementing a sustainability-driven service-learning project with a business partner (Stuteville and Ikerd, 2009). These experiences might change the expectations, aspirations or the feeling of self-efficacy (Biberhofer and Rammel, 2017; Mezirow, 2000; Morrel and O'Connor, 2002). Students are offered the opportunity to reflect on those changes and to revision their mission and vision accordingly. Furthermore module 5.2 is the first concrete step towards the creation of an own sustainability-driven enterprise. Following the first semester when students detected and developed various, rough business opportunities from a third-person perspective, now they choose one best idea that fits to their personal motivations and are able to develop it further to have a detailed business idea with a corresponding business model.
During the second semester, students are asked to strengthen their mentoring contacts e.g. through regular meetings, some days of job shadowing etc.

Sub questions for module 5.2

How to transform a personal vision and mission? What can be learned from role models and mentors concerning the student's own business idea? How to develop your own sustainability-driven business model?

Module 5.3 Personal development and coaching 3

In the third semester module 5.3 again offers time and space for reflection of the learning experiences and students are encouraged to keep their mentoring network alive. The core activity is the development of a business plan based on the individual business model developed in semester two. Module 5.3 ends with a week of fear and failure. This is intended as a last step to prepare students mentally for starting their own business. During the week they meet entrepreneurs and learn from their personal reflections and stories of fears and failures but also what motivated them to start again. The overall aim of the week is that failure is perceived as an integral part of the learning process of an entrepreneur. The storytelling is accompanied by inputs on legal, insurance and financial aspects of failure and experiential activities in which students can test their attitudes towards risk, they experience failure and learn to deal with it.

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Sub questions for module 5.3

How to develop a sustainability-driven business plan which reflects a personal vision and mission? What can be learned from fears and failures of experienced entrepreneurs? How can I transform fears and failures and learn from/personally grow with them?

Module 5.4 Thesis

In the last semester, in module 5.4 students will conduct activities to write their master thesis. It is recommended that the students either prototype or create their own sustainability-driven venture/start-up or implement a sustainability-driven project in an existing enterprise, non-profit organization or network. They shall monitor the process and evaluate the outcomes in terms of an impact assessment. A (research) colloquium functions as a base where students and teachers meet regularly for exchange on the progress of the thesis projects, and where research methods and tools can be repeated according to the students' needs.

Sub questions for module 5.4

How to implement a sustainability-driven business plan? How to assess the impact of sustainability-driven projects?

2.4.6 Thematic Block 6: Individual focus area for specialization

Key questions: *What are relevant specialization areas for creating and implementing a sustainability-driven business plan? What are the regional hot spots and thematic challenges which need a sustainability-driven entrepreneurial solution?*

The thematic block aims:

- Understanding regional hot spots and thematic challenges
- Deepen knowledge about challenges via picking a specialization area connected to thesis
- Deepen knowledge and getting experiences from an internship
- Creating ideas and solutions for challenges of regional actors within a transnational network

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To foster a mutual learning process in terms of a joint, transnational master program thematic block 6 encourages students to focus on a particular thematic challenge connected with their thesis project. The focus on regional hot spots (Barthel et al, 2014; Wallbaum and Kummer, 2006) within this block offers the opportunity to exchange knowledge and solution strategies with different stakeholders of various regions. As reflected in the CASE Needs Analysis, sustainable socio-economic development is embedded in regional contexts, therefore sustainability-driven entrepreneurial solutions can only be created if particular regional frames and conditions are reflected. Opportunities and obstacles of the CASE regions are summarized in the CASE Needs Analysis (Bernhard et.al. 2015, p.24-25) or other European strategies such as the research and innovation strategies for smart specialization (RIS3 or S3, see Figure 10) (European Commission, 2015). From this perspective thematic block 6 offers students the possibility to learn from various contexts and initiate new strategies in particular specialization areas within a transnational network of the master program.

FIGURE 10: SIX FIELDS OF SMART SPECIALIZATION STRATEGIES (S3) (EUROPEAN COMMISSION, 2015)

Module 6.1 Elective courses and 6.3 Internship

Module 6.1 and 6.3 therefore provide the opportunity for picking a specialization area. Students choose courses particular interesting for their solution concepts and learn from an internship which is recommended to be combined with the topic of the thesis. Elective courses are recommended to focus on regional opportunities and/or challenges.

Sub questions for module 6.1

What can students learn from practice/ an internship in the field of their specialization area? Which additional courses help students to deepen their understanding about regional challenges and transnational opportunities?

Module 6.2 Regional hot spots and thematic challenges

Module 6.2 focuses on regional hot spots and thematic challenges connected to innovation processes. Students should emphasize their studies on not more than two regional fields (e.g. energy, agriculture etc.) and develop solutions for challenges of regional actors. Exchange with different universities via a virtual seminar helps students to embed their experiences within a transnational network and learn from each other via reflecting about various challenges and potentials.

Sub questions for module 6.2

Which regional hot spots are particular relevant for developing sustainability-driven entrepreneurial solution concepts for? What can be learned about innovation processes of this regional hot spot? How can solutions for challenges of regional actors look like? How can a transnational network support this process?

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3. WP 4: Analysis of inter- and transdisciplinary teaching and learning methods

3.1 Objectives and activities of WP 4

The aim of WP 4 is to assess appropriate teaching and learning methods and best-practice examples that foster the acquisition of expertise and competence development in the field of sustainability-driven entrepreneurship and that can be recommended for the master program. The assessment of teaching and learning methods serves as preparation for the teaching of regional pilots (WP 5 and WP 6), for the course and module development of the master program as well as for teacher trainings.

WP 4 is based on the results of the CASE needs analysis (Bernhardt et al., 2015) where competencies to be fostered within the master program have been depicted and some methods suggestions have already been made. Since competence development through adequate teaching and learning methods is directly linked to specific knowledge or content areas, WP 4 is closely linked to WP 3, contents. It is also linked to WP 5 and 6 where some methods, especially transdisciplinary methods will be tested in pilots.

WP 4 consists of three tasks: 1. a literature review on inter- and transdisciplinary forms of teaching and learning in the context of sustainable (socio-economic) development and sustainable entrepreneurship; 2. an analysis of best practices of inter- and transdisciplinary forms of teaching and learning in the context of sustainable (socio-economic) development and sustainable entrepreneurship; 3. the development of a series of (virtual) seminars for university teachers “inter- and transdisciplinary methods of teaching and learning in the context of sustainable (socio-economic) development and sustainable entrepreneurship”. These three tasks are accompanied by two European Partner Workshops that focus on discussing the results of the review and analysis as well as how the different methods will be used in the master program.

Accordingly, three strains of activities were conducted within WP 4. We have conducted a broad literature review on inter- and transdisciplinary methods in sustainability and entrepreneurship education (presented in 3.2). We had workshops that addressed good-practice examples of teaching methods as well as stakeholder perspectives on draft versions for the master program in order to get feedback on competencies, contents and methods that should define the master program (see chapter 1.3). Through the knowledge exchange in the workshops as well as the literature review we assessed best-practice methods (3.4). The stakeholder feedback in combination with our expertise gave the rationale for recommending appropriate methods for the master program and its modules (see results, chapter 4).

The following report section of WP 4 provides a knowledge base where teachers can learn about state of the art concerning teaching and learning methods for higher education for sustainable development and for entrepreneurship. First, the statistical results of a systematic literature review provide an overview of trends in the research and practice area of higher education for sustainable development and for entrepreneurship (3.2). A short theoretical section follows to outline principles of competence-oriented teaching and learning and to guide through the “jungle” of terms for teaching and learning methods (3.3). Last, but not least, a multitude of good practice gives an impression how competencies and skills can be fostered in these two areas of higher education (3.4). Teachers who are looking for inspiration can pick up some new ideas in order to broaden and professionalize the repertoire of their own teaching practice. We conclude the report part for WP 4 with a summary of the pedagogical framework that we recommend for the master program (3.5).

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3.2 The Literature review

The aim of the literature review (see list of articles in appendix 1) was to create a systematic overview of teaching and learning methods used and recommended in the two educational fields relevant for sustainability-driven entrepreneurship, namely entrepreneurship education and education for sustainable development, in order to assess adequate, state of the art teaching and learning methods for the master program. We were interested in the collection of teaching experiences to learn how certain methods can best be implemented and to learn what competences are fostered.

3.2.1 Methodology

We have chosen to conduct a systematic literature review. Systematic reviews in educational science represent a typical way of mapping the field and tracing recent developments (Petticrew & Roberts, 2006). We followed the systematic review approach outlined in Fink (2014). Going through the steps of (1) data collection, (2) data processing and coding and (3) data analysis, we have produced a bibliometric overview that combines a quantitative analysis with a qualitative analysis of teaching and learning methods in higher education for sustainable development and for entrepreneurship. The study includes all peer reviewed and in English available articles referenced in two major data bases (Web of Science, ERIC)[1]. Only articles are included in the sample, which focus on presenting and analyzing programs, courses, approaches and methods of teaching and learning in higher education for sustainable development (HESD) and entrepreneurship (HEE). The sample consists of (to date) 110 articles. In the coding process the following categories were used: country of the (first) author, (first) author's discipline, educational focus (HESD versus HEE), research approach (conceptual versus empirical), learning outcomes, reference to competence models, teaching and learning approaches and the realization of inter- and transdisciplinarity. Based on the abstracts and, if needed, the full text, for each variable every article was coded following pre-defined coding instructions.

3.2.2 Results

Descriptive statistics of the review are reported briefly here. Further qualitative results relevant for assessing teaching and learning methods for the master program are included in the following parts describing and recommending methods (3.3 and 3.4) as well as in the results section (4) where the CASE master program is drafted. Insights gained concerning needs for teacher capacity building are included in the outlook for a teacher training (5).

1 For searching the databases the following key words were used:
(a) "higher education" OR "university" OR "tertiary education" OR "college";
(b) "education for sustainable entrepreneurship" OR "education for sustainability management" OR "education for sustainable business" OR "education for sustainability" OR "education for sustainable development" OR "sustainability education" OR "entrepreneurship education" OR "entrepreneurial education";
(c) "didactic*" OR "pedagog*" OR "method*" OR "interdisciplinary method*" OR "interdisciplinary learning" OR "transdisciplinary method*" OR "transdisciplinary learning" OR "experiential learning" OR "experience-based learning" OR "participatory learning" OR "self-directed learning" OR "problem-based learning" OR "collaborative learning".

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Most articles come from researchers of the United States (29), the United Kingdom (21) and Australia (16), followed by the Netherlands (6) and Canada (6). English speaking countries are clearly dominating the international literature of this area. More details are included in Table 1.

TABLE 1: LITERATURE REVIEW – COUNTRY OF THE FIRST AUTHOR'S UNIVERSITY

Country of first author's university	Number
USA	29
UK	21
Australia	16
NL	6
Canada	6
China	4
Sweden	3
Finland	2
Germany	2
Israel	2
Japan	2
New Zealand	2
Norway	2
Spain	2
Turkey	2
Egypt	1
Estonia	1
France	1
India	1
Ireland	1
Latvia	1
Malaysia	1
Singapore	1
South Africa	1
Sum	110

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Most authors have a background in business, economics and entrepreneurship (34%), 25% have their background in environmental and sustainability science, 24% in education, 9% in social and cultural sciences, 7% in other disciplines (engineering, land planning and tourism) and 2% could not be identified (see Table 2). Not corresponding to the first authors disciplines, 63% of the articles address the field of higher education for sustainable development (HESD), 36% the field of higher education for entrepreneurship (HEE) and only one article (<1%) was coded as being at the interface of HESD and HEE (dealing with the introduction of ESD in a business course) (see Table 3).

TABLE 2: LITERATURE REVIEW – ACADEMIC DISCIPLINE OF THE FIRST AUTHOR

Discipline of the first author		
Business, economics and entrepreneurship	37	34%
Environmental and sustainability sciences	27	25%
Education	26	24%
Social and cultural sciences	10	9%
Others	8	7%
Not identified	2	2%
Sum	110	100%

TABLE 3: LITERATURE REVIEW – EDUCATIONAL FOCUS OF THE ARTICLE

Educational focus		
HESD	69	63%
HEE	40	36%
Other (sustainability in business education)	1	1%
Sum	110	100%

The research approach described in the reviewed articles is mainly conceptual referring anecdotally or as a case study to experiences (45%) (see Table 4). One in three articles (33%) follows an empirical research design that mainly focuses on an evaluation of the presented teaching and learning method. On in five articles (18%) is purely conceptual. Five articles have been categorized as following both, a conceptual as well as an empirical research design.

TABLE 4: LITERATURE REVIEW – RESEARCH APPROACH DESCRIBED IN THE ARTICLE

Research approach		
Conceptual with empirical experiences	49	45%
Empirical	36	33%
Purely conceptual	20	18%
Both: conceptual + empirical	5	5%
Sum	110	100%

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We have distinguished whether an article focuses on the description and analysis of a whole study program, a single course, a specific teaching method/instruction or more general a pedagogical approach. Most often a course is analyzed (44%), followed by pedagogical approaches (35%) and teaching methods (21%) (see Table 5). Only in three articles (3%) the main focus is on a study program as a whole. Most articles (54%) describe in detail the presented method (see Table 6), so that the reader gets a helpful understanding how the course, teaching and learning approach or teaching method works and might be adapted by oneself. 41% of the articles provide a rather short overview of the analyzed method and 5% of the articles do not provide any description of the method.

TABLE 5: LITERATURE REVIEW – LEVEL OF THE DESCRIBED TEACHING AND LEARNING METHOD

Level of the method		
Course	48	44%
Teaching and learning approach	38	35%
Teaching method	21	19%
Study program	3	3%
Sum	110	100%

TABLE 6: LITERATURE REVIEW – QUALITY OF THE DESCRIPTION OF THE METHOD

Method description		
Detailed description/focus	59	54%
Short description/overview	45	41%
No description	6	5%
Sum	110	100%

Concerning learning outcomes, most articles provide theoretical considerations of what can be learned (39%), followed by qualitative empirical results (25%) and quantitative empirical results (16%) of learning outcomes (see Table 7). 18% of the articles provide a mixture of theoretical considerations or empirical results of learning outcomes. The great majority specifies intended learning outcomes (only 9 articles do not). As for competence-orientation, only 35% articles refer to defined sets of competencies or competence models. When doing so, most often authors referred to the concept of action competence by Mogensen and colleagues (Mogensen & Schnack, 2010) (5 times), to the sustainability competencies defined by Wiek et al. (2016; 2011) (4 times), and sustainability literacy as defined by Parkin and colleagues (2004) (4 times). In the area of entrepreneurship education the entrepreneurial competencies as outlined by Gibb (1996) were most often referred to (2 times).

TABLE 7: LITERATURE REVIEW – SPECIFICATION OF LEARNING OUTCOMES

Learning outcomes		
Conceptual/theoretical	43	39%
Qual-empirical	28	25%
Quan-empirical	18	16%
Mixed	20	18%
None	1	1%
Sum	110	100%

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We coded and counted teaching and learning approaches that were explicitly mentioned by the authors themselves (e.g. 'the course was designed as an experiential learning opportunity') or when the descriptions of courses or methods were clearly attributable to a specific teaching and learning approach (e.g. 'intensive group discussion' was coded as 'collaborative learning'). Synonyms for the same approach were coded as the same (e.g. 'problem-based learning' and 'problem-oriented learning'). The number of codes per article varied from one to eight. In total, 560 teaching and learning approaches were coded in 110 articles (see Table 8).

Active learning might be the fundamental principle of all teaching and learning methods in our sample since it is common knowledge that active knowledge and competencies can only be developed by the learner and not taught by the teacher. Nevertheless, only nine articles (8%) mention 'active learning' explicitly as a teaching principle. 'Participatory learning' which underlines the active participation of learners in the learning process and therefore has a similar notion as active learning is named in 12% of the articles. On the other hand, only 10% of the articles explicitly mention to base their teaching on 'traditional forms of learning' like lecturing and text-based learning. 'Learner-centered learning' (including 'self-directed learning') and 'reflective learning', both regarded essential for competence development, have been coded 39% and 35% of the articles. 'Collaborative learning' (including all kinds of group work) is one of the teaching and learning approaches best represented in the sample. It is mentioned in or attributable to 80 out of 110 articles (73%). This stresses the importance of learning together and through other people in the fields of HESD and HEE. 'Experiential' learning is another teaching and learning approach best represented in the sample. It is mentioned in or attributable to three in four articles (75%). 'Action learning' which can be interpreted as a special form of experiential learning additionally is named in 30% of the articles. This stresses the importance of learning by doing and through experience. More specific pedagogical approaches like 'project-based learning' (35%), 'problem-based learning' (26%), 'real-life learning' (24%), 'inquiry-based learning' (19%), 'service-learning' (15%), and 'place-based learning' (15%) are less, but in sum well represented. Furthermore some authors explicitly address 'transdisciplinary learning' (11%), 'interdisciplinary learning' (8%) and 'intercultural learning' (5%) which all include aspects of collaboration, dialogue and exchange. 'Social learning and modelling' (15%), and 'coaching and mentoring' (5%) also have the notion of learning with others. In contrast to collaborative learning social learning happens more informally and implicitly by observing role models, while coaching and mentoring implies that the persons take different roles in their interaction. Articles explicitly aiming at 'transformative learning' are not that much represented (10%). 'Moral, normative and value-based learning' (5%), 'affective learning' (3%), and 'spiritual learning' (2%) perhaps could further be linked to the concept of transformative learning. 'Virtual learning' (including blended learning) is not much reported on (9%). There are some more approaches (20%) that were summarized in the category 'others' since they are quite special (e.g. embodied learning, aesthetic learning or neuro linguistic programming). Some of them might also fit into other categories (e.g. embodied learning as a form of experiential learning).

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TABLE 8: LITERATURE REVIEW – TEACHING AND LEARNING APPROACHES DESCRIBED IN THE ARTICLES

Teaching and learning approaches (as mentioned by the author or directly attributable)		
Experiential learning	83	75%
Collaborative learning	80	73%
Learner-centered learning	43	39%
Project-based learning	39	35%
Reflective learning	38	35%
Action learning	33	30%
Problem-based learning	29	26%
Real-life learning	26	24%
Inquiry-based learning	21	19%
Social learning and modelling	17	15%
Place-based learning	16	15%
Service-learning	16	15%
Participatory learning	13	12%
Transdisciplinary learning	12	11%
Passive/traditional learning	11	10%
Transformative learning	11	10%
Active learning	9	8%
Interdisciplinary learning	9	8%
Intercultural learning	6	5%
Moral, normative and value-based learning	6	5%
Coaching and mentoring	5	5%
Affective learning	3	3%
Spiritual learning	2	2%
Virtual learning	10	9%
Others	22	20%
Sum	560	509%

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As we are especially interested in teaching and learning methods that work with inter- and transdisciplinarity, we coded the realization of inter- and transdisciplinarity separately (in addition to inter- and transdisciplinarity as teaching and learning approaches mentioned by the authors themselves) (see Tables 9 and 10). 35% of the described methods work with both, interdisciplinary classes and interdisciplinary teacher teams. Additionally, in 23% of the cases, only the students are mixed in respect to their discipline, while in 3% of the articles this is the case only for the teachers. In 33% of the articles, the courses, approaches and methods do not refer to interdisciplinary aspects. Concerning transdisciplinarity, 65% of the articles describe some form of transdisciplinary collaboration in their teaching and learning method. Having a closer look who the collaboration partners were revealed that most often the partners come from more than one area (27%) or from businesses only (16%). Less often, partners are NGOs (4%), the university and its campus (3%) or schools (2%). 5% of the articles do not provide examples of transdisciplinary collaboration but do recommend working with partners.

TABLE 9: LITERATURE REVIEW – REALIZATION OF INTERDISCIPLINARITY

Interdisciplinarity		
Both	39	35%
Students	25	23%
Lecturers	3	3%
Other	7	6%
No	36	33%
Sum	110	100%

TABLE 10: LITERATURE REVIEW – REALIZATION OF TRANSDISCIPLINARY COOPERATION

Transdisciplinarity		
Mixed	30	29%
Business	18	17%
NGO	4	4%
University /campus	3	3%
Schools	2	2%
Others	9	9%
Recommended	6	6%
No	38	37%
Sum	110	100%

3.2.3 Summary and discussion

The literature review shows that the teaching and learning approaches that are currently recommended as best-practice are competence-oriented. Principles and activities of active, learner-centered and reflective learning, recommended as the basic principles to foster competences, are represented throughout the articles, but not always mentioned explicitly. The need for learning together and through experience is underlined by the results. Even more as inter- and transdisciplinary learning, intercultural learning, social learning and coaching all include notions of collaboration, and learning approaches like service-learning or place-based learning also include experiential learning. From the results it can also be recommended to orient the learning towards problems and (in a more research-oriented form) towards the inquiry of

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problems. Furthermore, the literature review revealed that learning in HESD and in HEE integrates different disciplinary perspectives but also different stakeholder perspectives through inter- and transdisciplinary learning. Although not always explicitly focused as a teaching and learning approach, almost two in three articles described courses and approaches that used inter- and transdisciplinary learning. Additionally, two third of the articles describing transdisciplinary teaching and learning together with almost one quarter of the articles following a real-life approach are evidence that classes in HESD and HEE open up for the world to let students apply their knowledge in real-life situations in order to foster action competence.

Interestingly, the intended and measured learning outcomes are mostly described on a level below (key) competencies as outlined in competence models. This might be due to the level of the described teaching and learning activities, since most articles present courses or single teaching and learning activities and not a whole study program. A whole study program might be perceived as more suitable to develop comprehensive sustainability and entrepreneurial competencies. Nevertheless, it would be useful to have an idea which single course or method specifically contributes to a certain, more comprehensive competency in order to monitor on a macro-level whether all competencies of a holistic competence-model are fostered throughout the program.

In conclusion, it can be stated that the review underlines the huge interest and abundance of experiences in competence-oriented, especially inter- and transdisciplinary teaching and learning in the academic community of HESD and HEE. The database of articles serves as a rich source for teachers in HESD and HEE, and joined together for teachers of sustainability-driven entrepreneurship, to get inspiration and to learn from their colleagues.

We have already chosen some examples as recommendations for further reading when explaining and describing teaching and learning approaches and methods (chapters 3.3 and 3.4) or as a model for courses in the master program (chapter 4).

3.3 Theoretical background on methods

When talking about “teaching and learning methods” concerning the development of the master program some distinctions or clarifications on the term “method” have to be made. For assessing adequate methods, we distinguish between course formats, teaching and learning approaches, and concrete teaching methods. While the course formats already define the conditions of the learning setting to a certain extent (e.g. number of students, time for interaction versus individual study), teaching and learning approaches can be characterized as principles that guide the whole course design at the macro level and the attitude of the teacher concerning his/her role and that of the learner. Last, concrete teaching methods are relevant at the micro level when it comes to plan a single session of a course.

3.3.1 Course format

The course format shapes the setting and context for teaching and learning. The format has profound implications for the (learning) atmosphere in class, what students expect as their contribution and what teaching methods can be applied. Typical formats represented in study programs are:

- Lecture
- Seminar (sometimes specified as a project seminar)
- Tutorial
- Internship

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- Thesis (with colloquium).

We distinguish the following course formats and list some of its main characteristics:

Lecture

- Often a 2-4 hour session per week with bigger classes (more than 30 students).
- Focus is on the acquisition of knowledge – this might be basic for an overview of an academic field or quit special to foster disciplinary expertise.

→ Competence orientation: The knowledge should be critically reflected and deeply processed by the learners. Options to foster active and critical learning in lectures are to combine it with a learner-centered approach (e.g. flipped classroom, see 3.4.3) or problem-based learning and to stimulate reflection (e.g. through Socratic questioning, see 3.4.3).

Seminar

- Weekly: Often a 2-4 hour session per week with smaller classes (less than 30 students).
- Block: Often 1-3 blocks of 2-5 days with smaller classes (less than 30 students).
- Focus is on deepening specific aspects of an academic field.

→ Competence orientation: Due to their flexibility and small classes, seminars provide the perfect setting for self-directed, collaborative, and experiential learning via projects, group work, intensive discussions and (group) coaching. Block seminars provide the context were a trustful, intense group atmosphere can be created that allows for deeper self-reflections, but they come with the disadvantage that deeper, long-term involvement in real-life problems, or the development of a project is more difficult or even impossible.

Tutorial

- Often 1-2 hour sessions per week
- Accompanying a lecture or course/seminar
- Training, practice and application of theoretical knowledge, tools or (research) methods

→ Competence orientation: Due to their flexibility, practical orientation and small classes, tutorials provide the perfect setting for collaborative and action-oriented learning via training, group work, intensive discussions and coaching. They can also be used for reflections to draw linkages between theory and practice, between abstract knowledge and personal relevance.

Internship

- As a block: can last from some few weeks up to 6 months
- Accompanying a lecture or seminar during the semester: some hours or days per week
- Practice and action orientation, job experience, training on the job

→ Competence orientation: Internships provide real life learning opportunities. Students acquire a lot of useful skills and get an orientation what their future field of action might be. The challenge is to link academic knowledge and the practical experiences so that students can apply the knowledge gained at university while experiencing the challenges and conditions in the world of practice. Often the feeling is that the theoretical knowledge is of limited help. This is important to reflect in accompanying courses as this experience might turn into a motivating factor to study more.

Thesis (with colloquium)

- Often 1 semester, sometimes with a weekly or irregular 1-2 hour session for exchange on research questions
- Research focus, intensive discussion of specialists

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→ Competence orientation: The thesis requires self-directed and self-structured learning processes. As it is organized around a research question it involves problem- and inquiry-based learning. A thesis as a major research project can be very action-oriented when it is less theoretically driven, but more oriented towards application and outcomes in the real world. There are a lot of possibilities to work on a thesis in transdisciplinary cooperation with partners (e.g. as service-learning). Students can also work on a thesis as a group where each student is responsible for an individual part. An accompanying colloquium offers an open space for discussion, feedback and coaching.

Special formats

- No meeting with the whole group
  - Might be part of a seminar or might be formally labelled as a seminar
  - Examples:
    - Self-study courses (sometimes with support from virtual lectures or seminars)
    - Individual coaching
    - Mentoring
- Participation in special events
  - Might be part of a seminar or might be formally labelled as a seminar
  - Examples:
    - Conferences
    - Excursions
    - Workshops
- Student-led university businesses
  - Might be part of a seminar or might be formally labelled as a seminar

→ Competence orientation: The variety of special formats allows all kinds of learning approaches and processes.

3.3.2 Teaching and learning approaches

There exists a diversity of terms and corresponding concepts (principles of learning, learning design, teaching strategy, didactic approach, teaching-learning arrangements etc.) that we named and summarized as teaching and learning approaches. We define teaching and learning approaches as theoretical concepts that describe on a meta-level how the learning should be facilitated (for competence-oriented teaching and learning). Pedagogical approaches are linked to course formats and teaching methods, but not in a one-to-one matching.

In the following section we briefly describe the most relevant teaching and learning approaches for HESD and HEE as it appeared in the results of the literature review (see chapter 3.2). For each approach, we explain the core idea and the main objective focusing of its use in HESD and HEE. We also show linkages to other approaches. Furthermore, we provide sources of articles that might be helpful to get a deeper understanding of the approach.

Active learning

Core idea: From a constructivist perspective competencies, including knowledge, attitudes and skills, cannot be taught but have to be actively acquired by the learner him- or herself. The learner has to elaborate on knowledge, rethink it critically and integrate in his/her own framework. “Active learning is the generic term for teaching pedagogies that require the educator to privilege the learner’s participation over his or her own declarative knowledge of the subject” (MacVaugh & Norton, 2012).

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Main objective: Active learning shall foster "increased personal motivation, reduction of strategic learning behavior, improving deep understanding, development of critical thinking and development of reflexive abilities that support life-long learning" (MacVaugh & Norton, 2012, p. 74). Active learning can be contrasted to more traditional forms of teaching like memorization that produce "sluggish" knowledge (MacVaugh & Norton, 2012).

Teacher's role: Having quoted the statement above, almost everything is said about the teacher's role and his/her attitude towards teaching in an active learning approach. It emphasizes the learner's agency and responsibility in acquiring and constructing knowledge. Therefore, the teacher assumes the role of a facilitator of learning processes. He/She "only" inspires for topics and learning activities.

Synonyms or similar approaches: Participatory learning

Linkages: Active learning as a fundamental principle for competence development is included in almost all other teaching and learning approaches.

Sources for further reading:

- MacVaugh, J., & Norton, M. (2012). Introducing sustainability into business education contexts using active learning.

Learner-centered learning

Core idea: Learner-centered approaches see students as autonomous learners who are responsible for setting and achieving their learning targets by choosing how, when and where they learn (Harkema & Schout, 2008; Jones & English, 2004). Students' prior knowledge as well as their experiences in the social context are the starting points for stimulating learning processes of students who define their learning target and construct their own knowledge base (Barth, 2015; Harkema & Schout, 2008). It "includes collaborative activities, goal-driven tasks, intellectual discovery, activities that heighten thinking, and activities that provide practice in learning skills" (Jones & English, 2004, p. 420).

Main objective: Learner-centered "emphasizes the active development of knowledge rather than its mere transfer" (Barth, 2015, p. 92). Or put another way, it aims at deeper learning processes, not at passive experiences (Jones & English, 2004). Especially in self-directed learning approaches, learning about one's own learning strategies becomes an explicit topic and students can develop their learning competence.

Teacher's role: Learner-centered approaches require students to reflect on their own knowledge and learning processes in order to manage and monitor them. Teachers should give guidance for those reflections. Learner-centered approaches change the role of a teacher who becomes the moderator and coach of learning process (instead of being someone who only transfers structured knowledge).

Synonyms or similar approaches: self-directed learning

Linkages: Learner-centered approaches are directly linked to active learning.

Sources for further reading:

- Harkema, S. J. M., & Schout, H. (2008). Incorporating Student-Centred Learning in Innovation and Entrepreneurship Education.
- Hegarty, K., Thomas, I., Kriewaldt, C., Holdsworth, S., & Bekessy, S. (2011). Insights into the value of a 'stand‐alone' course for sustainability education.

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- Jones, C., & English, J. (2004). A Contemporary Approach to Entrepreneurship Education.

Reflective learning

Core idea: Competence development and active construction of knowledge take place through reflection. Contents and experiences are deeply elaborated, rethought and integrated into existing frames of reference (or the frames are adapted). Reflection is an abstract, higher order cognitive skill that needs extra time and space to occur. For example, explicit reflection is the complementary part to action or "learning by doing" (Cörvers et al., 2016), because it includes critically reflecting and analyzing problems on a more conceptual, abstract level (Barth, 2015).

Main objective: Reflections aims at a comprehensive competence development (Cörvers et al., 2016). Reflection also has the power to change existing frames of reference for transformative learning.

Teacher's role: The teacher is a facilitator of learning processes. It is his/her responsibility to stimulate reflection that integrates ethical and value-based considerations e.g. in problem-solving activities, that links action and theory etc.

Synonyms or similar approaches: learning by reflection, debriefing, reviewing

Linkages: Reflective learning is an integral part of competence-oriented teaching and learning. It is part of almost all other competence-oriented teaching and learning approaches like problem-based learning (which is inquiry plus reflection of an issue), experiential learning (which is experience plus reflection of an issue) or service-learning (which is linking disciplinary, formal learning with informal learning in a service through reflection).

Sources for further reading:

- Cörvers, R., Wiek, A., Kraker, J. de, Lang, D. J., & Martens, P. (2016). Problem-Based and Project-Based Learning for Sustainable Development.
- Greenaway, R. (2002). The Art of Reviewing.

Collaborative learning

Core idea: Collaborative learning simply means that students learn together. When students learn together collaboratively in small groups, they can share knowledge, but as well they can challenge and negotiate their knowledge, attitudes and beliefs, so that learning effects can be maximized (Cörvers et al., 2016). The learning is more dynamic and motivating. They "synthesize, communicate, and discuss ideas in ways that advance conceptual understanding" (Slavich & Zimbardo, 2012, p. 571). It underlines competence development as a social activity. It "involves joint learning processes with participation and empathy as critical factors" (Barth, 2015, p. 93). The difference to cooperative learning has to be stressed, where learners divide tasks and work on them separately. Successful collaboration builds on shared learning objectives and the appreciation of different opinions or approaches (Barth, 2015).

Main objective: Through the interaction and comparison with others, students can restructure their understanding of concepts and recognize gaps in their knowledge. Peers can function as models for learning through social modeling (cf. Slavich & Zimbardo, 2012).

Teacher's role: The teacher is a facilitator of group processes and discussions.

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Linkages: Special forms of collaborative learning determine who is learning together like in interdisciplinary, transdisciplinary or intercultural learning. Collaborative learning (in addition to cooperative learning) can be fostered in project- or problem-based learning in groups.

Synonyms or similar approaches: group learning; group work; team work

Sources for further reading:

- Slavich, G. M., & Zimbardo, P. G. (2012). Transformational Teaching: Theoretical Underpinnings, Basic Principles, and Core Methods.

Experiential learning

Core idea: In short: Students engage in and reflect on personal experiences related to the course content (Slavich & Zimbardo, 2012). The experience might come from a simulation game, the conduction of an interview, etc. Experiential learning goes back to Kolb's learning cycle of experimental learning with the stages 1. Having a concrete experience, 2. Observation and reflection, 3. Formation of abstract concepts for generalization and 4. Application in new situations (Kolb, 1984).

Main objective: Experiential learning shall increase knowledge acquisition, skill development, and values clarification by linking rather abstract concepts to personal experience and the student's life (Slavich & Zimbardo, 2012).

Teacher's role: The teacher designs the experience and gives instruction for reflections. This way he/she is more of a facilitator than an expert referring on his/her knowledge.

Synonyms or similar approaches: Experience-based learning; learning-by-doing; action learning: The experience that serves for reflection in the learning process is direct action like in an internship or a service-learning project, whereas experiential learning can also work with experiences in games, role plays or imaginations.; opportunity-centered learning in HEE: "Opportunity-centered learning (…) encompasses four interconnected processes: 1) exploring the opportunity, 2) relating the opportunity to personal goals, 3) planning to realize the opportunity and 4) acting to make the opportunity happen" (Lans, 2013; following Rae, 2003, p. 545).

Linkages: Experiential learning is learner-centered and active. It is often designed as a project. Subtypes are action-learning and service-learning.

Sources for further reading:

- Kolb, D. (1984). Experiential Learning. Experience as the Source of Learning and Development.
- Bliemel, M. J. (2013). Getting Entrepreneurship Education Out of the Classroom and into Students' Heads.
- For action learning in HEE: Rae, D. (2009). Connecting Entrepreneurial and Action Learning in Student-Initiated New Business Ventures: The Case of SPEED.

Problem-based learning

Core idea: Problem-based (or problem-oriented) learning (PBL) describes a learning process via understanding and solving problems (of complex real-world situations). "Students actively engage with meaningful tasks and complex scenarios, determine what they need to know and how and where they can

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find it" (Barth, 2015, p. 93). Instead of the teacher framing the problem, researching relevant information and presenting these, students do these tasks (Dobson & Tomkinson, 2012). PBL is linked to a specific context and situation in the way that it addresses an authentic scenario instead of only dry theory (Barth, 2015; MacVaugh & Norton, 2012; Wiek, Xiong, Brundiers, & van der Leeuw, 2014). Therefore it is said to have "a strong motivating effect" (Barth, 2015, p. 94) – given the assumption that learners want to become involved.

Main objective: Problem-oriented learning specifically aims at action or strategic competencies by supporting "action-relevant procedural knowledge and skills" (Barth, 2015, p. 93) especially through "implicit links with the processes of problematization, problem investigation, problem solving and critical reflection" (MacVaugh & Norton, 2012, p. 74). A critical understanding is stressed over finding feasible solutions, so that theory building is also fostered (Wiek et al., 2014).

Teacher's role: The teacher develops tasks and provides the setting in which students engage in problem-based learning. He/She should support the process of problem formulation to problem-solving with small-step assignments, by introducing students to relevant tools or methods and by providing feedback.

Synonyms or similar approaches: Problem-oriented learning; inquiry-based learning: A project- and action-oriented subcategory of PBL that has a strong research focus. Problems are not only analyzed applying theory and knowledge, but inquired and investigated in a (small) research project.

Linkages: PBL is strongly linked to self-directed learning, but also to experiential learning. PBL can also easily be linked to real-world and project-based learning.

Sources for further reading:

- Wiek, A., Xiong, A., Brundiers, K., & van der Leeuw, S. (2014). Integrating problem- and project-based learning into sustainability programs.
- Dobson, H. E., & Tomkinson, C. B. (2012). Creating sustainable development change agents through problem‐based learning.
- Ellis, G., & Weekes, T. (2008). Making Sustainability 'Real': Using Group-Enquiry to Promote Education for Sustainable Development.

Project-based learning

Core idea: Project-based learning in short describes the activity of "developing case-specific problem understanding to create feasible solution options" (Wiek et al., 2014, p. 434). It has a strong action-orientation. Project-based learning is complex because it needs a focus on content as well as process learning. Therefore, a formative assessment is recommended.

Main objective: It fosters new understandings, but foremost aims at solutions as practical products.

Teacher's role: The lecturer assumes the role of a coach. A professional project-management with corresponding tools and guidance should be provided by the lecturer (Wiek et al., 2014).

Synonyms or similar approaches: -

Linkages: Project-based learning is linked to self-directed and experiential learning and easily goes hand-in-hand with problem-based learning. It is also suited to be combined with transdisciplinary, real-world and

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service learning, when students collaborate with a partner to work on or for one of his projects *(Wiek et al., 2014).*

Sources for further reading:

- Wiek, A., Xiong, A., Brundiers, K., & van der Leeuw, S. (2014). Integrating problem- and project-based learning into sustainability programs.

Service-learning

Core idea: Service-learning is "a seminar-based, credit-bearing, educational experience in which students (a) participate in an organized service activity that meets identified community needs and (b) reflect on the service activity in such a way to gain further understanding of seminar content, a broader appreciation of the discipline, and an enhanced sense of civic responsibility" (Bringle & Hatcher, 1995, p. 112). The unique selling point of service-learning is its combination and balance of formal disciplinary and interdisciplinary learning (in the classroom) and informal learning during the engagement at a partner organization. Both types of learning must be integrated through reflection. One service-learning project comprises the circle of defining, planning, conducting and evaluating a project. All steps are done by the students in exchange with their service partner.

Main objective: The original intention of its founder John Dewey was to strengthen democratic values, civic responsibility and engagement (Sliwka, 2004). Originally, partners were communities and social institutions within communities. But enterprises can be service-learning partners as well, if the project aims at strengthening sustainable and democratic values in society. Furthermore, service-learning has shown to strengthen students' motivation for learning and to deepen disciplinary learning.

Teacher's role: The teacher assumes the role of a facilitator and a coach who organizes the learning process and supports the projects with his/her knowledge and experiences. He/She is responsible to provide opportunities were theoretical knowledge and experiences from the practical engagement can be integrated through reflection. It is possible, that the teacher also makes the first contact with partners and explores the needs that might be addressed by student projects. But it can also be part of the students' project to identify partners and explore their needs.

Synonyms or similar approaches: Community service-learning

Linkages: Service-learning is a special form of project-based learning. Furthermore it is linked to self-directed and real-world learning (Barth, 2015).

Sources for further reading:

- Van Wynsberghe, R., & Moore, J. L. (2014). UN decade on education for sustainable development (UNDESD): enabling sustainability in higher education.
- Chang, J., Benamraoui, A., & Rieple, A. (2014). Learning-by-doing as an approach to teaching social entrepreneurship.
- McCrea, E. A. (2010). Integrating Service-Learning into an Introduction to Entrepreneurship Course.
- Eby, J. W. (1998). Why Service Learning is Bad.

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Interdisciplinary learning

Core idea: In interdisciplinary learning, perspectives of different disciplines are not only represented and dealt with in the learning setting (multidisciplinarity), but collaborative tasks demand that the diverse perspectives and knowledge assets are communicated, discussed and integrated (Feng, 2012). Interdisciplinarity is necessary to solve complex, real-world challenges that involve and require expertise from more than one discipline.

Main objective: Interdisciplinary learning aims at the integration of different disciplinary perspectives and assets of knowledge in order to construct a comprehensive picture of complex problems and to use different methods or approaches for solving it.

Teacher's role: Teachers provide guidance for and moderate the knowledge construction processes (Barth & Burandt, 2013). They are translators and mediators between different disciplinary cultures. It is their task as moderators to promote dialogue, make interdisciplinary misunderstandings explicit when ignored or not perceived by the students and to let students discover the value of disciplinary diversity (Feng, 2012).

Synonyms or similar approaches: Intercultural learning

Linkages: Collaborative learning; transdisciplinary learning

Sources for further reading:

- Feng, L. (2012). Teacher and student responses to interdisciplinary aspects of sustainability education: what do we really know?
- Lans, T., Oganisjana, K., Taeks, M., & Popov, V. (2013). Learning for Entrepreneurship in Heterogeneous Groups: Experiences from an International, Interdisciplinary Higher Education Student Programme.
- Barth, M., & Burandt, S. (2013). Adding the 'e-' to Learning for Sustainable Development: Challenges and Innovation.

Transdisciplinary learning

Core idea: In transdisciplinary learning the academic learning is opened up and amplified through collaborative learning with partners from other sectors like civil society, enterprises, policy, schools, communities etc. At the center of the collaboration stands a complex problem or research question (cf. van Wynsberghe & Moore, 2014). The partners and students integrate their knowledge and resources to solve the problem together. The learning can "happen bidirectionally through the engagement in dialogue, activity, and learning with community members outside the academy" (van Wynsberghe & Moore, 2014, p. 316). In transdisciplinary contexts academic knowledge and approaches have to be rethought, adapted and normatively evaluated. If students work in transdisciplinary projects, the learning setting becomes an informal one where students develop a lot of social skills. All stakeholders should benefit in a transdisciplinary learning project, although the benefits might be of different natures; e.g. a motivating and rich learning experience for students vs. academic support for an enterprise vs. a research opportunity for lecturers (Hynes & Richardson, 2007).

Main objective: Students gain insights into real-world problems and conditions and learn to adapt their academic, classroom-based knowledge and skills to the real-life context.

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Teacher's role: The teacher becomes not only a moderator for the students' learning processes but also for the transdisciplinary, joint learning process of all stakeholders involved in the collaboration. Furthermore he/she has to be a networker and manager who initiates the collaboration, coordinates meetings etc.

Synonyms or similar approaches: Real-world learning, place-based learning

Linkages: Problem-based learning, service-learning, interdisciplinary learning

Sources for further reading:

- Van Wynsberghe, R., & Moore, J. L. (2014). UN decade on education for sustainable development (UNDESD): enabling sustainability in higher education.
- Hynes, B., & Richardson, I. (2007). Entrepreneurship education.

Transformative learning

Core idea: The key word for transformative learning is "frame of reference". Frames of reference describe how we perceive the world including habits of mind (e.g. habitual ways of thinking) as well as opinions and values (Slavich & Zimbardo, 2012). Frames of reference are shaped through social and cultural influences but can be changed through new experiences of problem-solving, of problem discussions, or of critical reflections on assumptions and interpretations. Four possible strategies in a learning setting are postulated for the modification: 1. Elaboration of existing frames, 2. Learning new frames, 3. Transformation of habits of mind, 4. Transformation of opinions (Slavich & Zimbardo, 2012 following Mezirow, 2000). Transformative learning is defined by its aims and principles, not by a concrete teaching or learning strategy. Sipos relates transformative learning to the teaching principle of "head, hands and heart" which means that all three psychological dimensions (affective, behavioral and cognitive) should be considered and involved in learning processes (Sipos, Battisti, & Grimm, 2008).

Main objective: Transformative learning aims at empowering students to question and "to change their frames of reference or worldviews" in order to develop their understanding of the world (Sipos et al., 2008, p. 71; Wals, 2011).

Teacher's role: The teacher is a coach who empowers students to change theirs worldviews. He/She can also be called an "'provocateur[]' who help[s] students become aware and more critical of their assumptions" (Slavich & Zimbardo, 2012, p. 579). Educationalists working with the concept of transformative learning take a critical perspective on education itself. They accept that education always is value-laden.

Synonyms or similar approaches: transgressive learning: underlines that learning (in HESD) has to overcome the status-quo and prepare the learner for disruptive thinking and co-creation of new knowledge; transformational learning: aims at personal growth and changes in the learners' attitudes towards learning; affective learning; moral learning; normative learning; critical learning; values-based learning: The core values (e.g. respect, responsibility, tolerance, and peace for sustainability in ESD) should inform the entire teaching and learning (Markley Rountree & Koernig, 2015).

Linkages: It can involve all kinds of pedagogical approaches – from problem-based approaches to traditional knowledge presentation to environmental education outdoor (cf. Sipos et al., 2008, p. 77). Anyway, group work and critical reflection are essential parts.

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- Mezirow, J. 2000. Learning as transformation: critical perspectives on a theory in progress (1st ed).
- Sipos, Y., Battisti, B., & Grimm, K. (2008). Achieving Transformative Sustainability Learning: Engaging Head, Hands and Heart.
- Wals, A. E. J. (2011). Initiative for Transformative Sustainability Education at Wageningen University, The Netherlands.
- Slavich, G. M., & Zimbardo, P. G. (2012). Transformational Teaching: Theoretical Underpinnings, Basic Principles, and Core Methods.
- Lotz-Sisitka, H., Wals, A. E., Kronlid, D., & McGarry, D. (2015). Transformative, transgressive social learning: rethinking higher education pedagogy in times of systemic global dysfunction.
- Markley Rountree, M., & Koernig, S. K. (2015). Values-Based Education for Sustainability Marketers. Two Approaches for Enhancing Student Social Consciousness.

Coaching and mentoring

Core idea: Coaching and mentoring can directly and flexibly react to individual needs. The two approaches "can be understood through the notion of becoming, through and in relation to others" (Rigg & O'Dwyer, 2012, p. 319). Coaching is based in the constructivist, systemic assumption that learners have to construct their knowledge in accordance to their existing frames of reference. Mentoring is based in social learning theory and serves two functions in the learning process: As role models mentors support the identity work of the learners developing an entrepreneurial identity and they are a source of social capital (Rigg & O'Dwyer, 2012).Whereas coaching has the idea, that the coached person is a competent individual who is in power of all resources needed to fulfil his/her tasks, the mentoring approach assumes that individuals learn best from other persons who are already one step further concerning their knowledge and development[2]. Therefore, a coach on the one hand has to ask the "right" questions to help the coached person explore his/her resources, goals and motivations or structure his/her thinking process or activities. And a mentor on the other side can help with concrete advice, challenge assumptions or tell and show how he/she is solving similar problems. For example, students might interview entrepreneurs about challenges they are currently facing (Bliemel, 2013).
Main objective: Coaching and mentoring are intended for tailored support for maximizing the effectiveness of a learning process.

Teacher's role: Coach or mentor him/herself or the facilitator who initiates, structures and guides peer coaching or other mentoring relationships by providing tools and questions for mentoring and coaching.

Synonyms or similar approaches: group coaching; peer coaching; social learning; modelling;

Linkages: collaborative learning, reflective learning

Sources for further reading:

- Rigg, C., & O'Dwyer, B. (2012). Becoming an entrepreneur: researching the role of mentors in identity construction.
- Bliemel, M. J. (2013). Getting Entrepreneurship Education Out of the Classroom and into Students' Heads.
- Williams Middleton, K., & Donnellon, A. (2014). Personalizing Entrepreneurial Learning: A Pedagogy for Facilitating the Know Why.
- Hynes, B., & Richardson, I. (2007). Entrepreneurship education.

[2] This idea goes back to Vygotsky's concept of the "zone of proximal development" (see in Rigg & O'Dwyer, 2012, p. 324).

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3.3.3 Teaching methods

There exists a great variety of teaching methods. It is possible to classify teaching methods on two dimensions. On the first dimension, they can be classified as being a 'direct instruction' where the knowledge is presented as such (e.g. a lecture, research report or a handout) or as being an 'indirect instruction' where students discover new knowledge and elaborate on it (e.g. in case studies, concept mapping or Socratic questioning). On the second dimension, a teaching method can be classified as using 'individual study' (e.g. assigned questions or essay writing) versus 'interaction' (e.g. all kinds of group work, role plays or brainstorming). Whereas 'interaction' can be further divided into the categories of 'partner work', 'small group work' or 'interaction in the plenary'.

As we favor methods that aim at active learning to foster competencies and avoid sluggish knowledge, the question is what types of methods are best suited to do so. There is no simple answer, but some heuristics: Concerning the first dimension, methods using indirect instruction in general foster for more learner activity than methods of direct instruction. Concerning the second dimension, active learning can occur in all forms of social learning arrangements. In individual study (at least in theory) the learner activity is highest (100%), since the learner has the full responsibility over the learning process and outcome (cf. learner-centered and self-directed learning). For the teacher to monitor learning process and outcome of each learner individually is difficult and resource-intensive. This can be partly reduced through peer assessment and feedback. The active learning part of a learner in group work is theoretically reduced in relation to the number of learners involved (lowest in plenary work). But still, having to deal with and integrate knowledge, perspectives or opinions of others can stimulate new thinking (cf. collaborative learning). In group work or plenary sessions, the learning process and outcomes can be monitored much better by the teacher.

Many methods can be varied in a way that they may change the categories of the two dimensions. For example a brainstorming can be done individually or in a group (individual study versus interaction). A lecture can be watched alone online (direct instruction in individual study) or it can even be designed as a flipped (inverted) classroom[3] with a lot of interaction and discussion (indirect instruction with interaction). Furthermore, most methods can be flexibly adapted to and used for different topics (e.g. lectures, socratic questioning or role plays are suited for various topics of HESD and of HEE). Other methods are quit specific and content-bound (like calculating the ecological footprint).

In general, a mixture of all working forms during one session as well as during the semester of a course is recommended. Only individual work is not motivating and does not allow for collaborative learning, whereas only plenary work is overly demanding and can dramatically decrease individual activity and the chance to elaborate on issues oneself. Following Barth (2015, p. 96), it is important to consider the micro-level of single methods within a session, but also the macro-level of the whole session and the whole course, and how the different methods and sessions contribute to the bigger picture of a course.

[3] The idea of a flipped classroom is that students watch the lecture online at home and the time in the classroom is used for intensive discussion and activity. Retrieved from https://www.knewton.com/infographics/flipped-classroom/ (2016/05/01) for a simple explanation.

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3.4 Recommendations, suggestions and good-practice for teaching and learning methods for the joint master program on sustainability-driven entrepreneurship

In this section we will report on recommendations, suggestions and good-practices for teaching and learning methods for the CASE master program. First, we briefly show the collection of recommendations that we got from stakeholders (see chapter 1.3). Next, we provide teaching examples of HESD and HEE from our own experiences or from the literature that demonstrate and explain the most relevant teaching and learning approaches (3.4.2) and interesting or innovative teaching methods (3.4.3) for the CASE master program. These examples also function as good practices for modules or courses that might be adapted and included in the CASE master program.

3.4.1 Suggestions from stakeholders

The following methods are suggestions made by stakeholders in the interviews of the CASE needs analysis (Bernhardt et al., 2015) and in the CASE workshops (from June 2015 to March 2016 in Vienna, Gothenburg, Vechta and Brno, see chapter 1.3) when they were asked what competencies should be fostered in a master program on sustainability-driven entrepreneurship and how. In line with the CASE needs analysis, we clustered them referring to key competencies for sustainability (cf. Wiek et al., 2011) and added the category of 'personal competence' which is more linked to entrepreneurial competencies and the role of pioneers. We also collected a list of possible cooperation formats that were suggested by stakeholders.

Anticipatory/Future-thinking competence

- methods for future scenarios: back- and forecasting/reverse modelling, scenario-analysis, dragon dreaming
- analysis of historical examples

System-thinking competence

- syndrome approach
- simulations
- multi-stakeholder analysis and projects
- earth walk activities (for changing perspectives and building connections between human and nature)

Normative competence

- critical thinking: reading and writing for critical thinking, deconstruction of knowledge
- dilemma analysis
- vision and norm formulation
- international dialogue and exchange

Strategic/Action competence

- tools for analyses: dilemma analysis and management, stakeholder analysis, social network analysis, SWOT analysis, life cycle analysis, material flow analysis
- training on project management e.g. dragon dreaming[4]
- real-life experience: integrating a stakeholder network into the program, mentoring, job-shadowing, setting up an own business (example of 1-year Master in Massachusetts), business plan competition,

[4] Retrieved from http://www.dragondreaming.org/ (2016/05/01)

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service-learning, research projects with companies and other organizations, guided internships, community building processes
- role plays, improvisation theater and simulation games e.g. for sale talks

Interpersonal Competence

- interdisciplinary master thesis themes
- communication skills: pitching, science slam, open discussions, participation in congresses and conferences, graphic recording, communication training, emotional moderation approach, interview and dialogue techniques
- group dynamics: analyzing errors in group behavior, team- and trust building activities, consensus activities, 5-7 days intensive group experience

Personal competence

- creativity: different earth walk activities like doing a forest-gallery or collecting „touches" of natural materials, jam sessions, (negative) Santa Claus method, science-fiction thinking, design thinking, ideation, excursions, ABC-development
- skills workshop
- experience of responsibility
- space for trials and errors and uncertainty: fear and fail conferences
- critical external experts
- processes of reflection: self-reflection (on own opportunities and responsibilities, one's mission, etc.), role model reflection
- take martial arts philosophy as a role model and practice it as personal training; martial arts exercises for teambuilding and fear experiences

Cooperation formats for transdisciplinary learning

- guest lectures
- entrepreneurs as teachers (at least in parts of courses)
- pitching etc. with a jury of entrepreneurs or other stakeholders
- story telling of entrepreneurs
- mentoring through entrepreneurs
- case and field studies of enterprises
- each student chooses a business at the beginning of the master as his/her "study object" to apply academic class learning to a practice context
- transdisciplinary research projects
- service-learning with start-ups, companies and not-for-profit organizations
- developing business plans with prisoners
- students work out creative solutions for challenges of sustainability-driven start-ups (cf. hold-up workshops from MakeSense[5])
- students do consulting for companies (difference to service-learning: the company defines the task alone)
- students help companies to develop sustainably as "co-researchers"
- internships

[5] https://www.makesense.org/

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- sharing/cooperation network
- conferences

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3.4.2 Recommended teaching and learning approaches with good practice examples

Pedagogical Approaches	Competence development and learning outcomes	Good Practice description	Aspects for implementation	Source
Learner-centered learning; Interdisciplinary learning; Problem-based learning; Experiential learning;	**Sustainability literacy**; critical decision-making; reflective practice; key academic skills;	At the RMIT University, Australia, the teachers constructed an introductory course for sustainability that was especially intended to help students to link the sustainability knowledge to their own discipline. It has four major features and aims: 1. Developing key academic and transferable skills; 2. Developing sustainability literacy by dealing with situated complex problems; 3. Highlighting value and belief systems in decision-making for sustainable futures; 4. Integrating sustainability into the students' disciplines by emphasizing the relationship to the professional fields.	Weekly 3-hour tutorials and an online learning hub are accompanying lectures for the integration of content and skill development;	Hegarty, K., Thomas, I., Kriewaldt, C., Holdsworth, S., & Bekessy, S. (2011). Insights into the value of a 'stand-alone' course for sustainability education.
Action-oriented/based learning; learning-through-venture-creation approach; personalized learning; reflective learning; collaborative learning; coaching;	**Entrepreneurial Learning:** Know why, know how, know what; incubating a venture;	During the master program, student teams are provided a novel idea for incorporation, most often stemming from university research. The learning during the program is delivered through multiple arenas and from multiple actors (e.g. incubators, entrepreneurial network members, alumni). The program strengthens the students' entrepreneurial identity by developing his/her understanding for why he/she engages and persists in taking entrepreneurial action. Most important for this are time for reflection, team-based work, the engagement in a real-life venture creation and coaching sessions with advisors including inquiry and feedback. The program shows to be successful: a total of 50 companies had been incorporated, of which 40 were still in existence when the article was written. The alumni are found to be practicing entrepreneurship in many different areas and perceive to have gained the relevant knowledge and skills to start a new business or a new initiative within an existing organization.	The master program is situated in a university focused on technology; Support comes from an entrepreneurial network and a pre-incubator that manages the recruitment of ideas for incubation, provides business advice and initial seed-investment; The assessment is difficult; The program is cost-intensive; Teaching includes: program and curricular design, along with creating syllabi, assignments, and evaluation; Facilitating includes: coaching, feedback, and dialogue;	Williams Middleton, K., & Donnellon, A. (2014). Personalizing Entrepreneurial Learning: A Pedagogy for Facilitating the Know Why.
Problem- based learning; Experiential	**Problem-solving skills for sustainable development;** Ethical consideration;	The described problem-based learning (PBL) courses worked with complex scenarios that could not be solved as straightforward problems, but "that must be investigated, leading to new strategies" The	Cases for problem-based learning of appropriate difficulty;	Dobson, H. E., & Tomkinson, C. B. (2012). Creating

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learning; Interdisciplinary learning; Transformational learning;		scenarios have been developed by a wide range of academics. They address for example shops, plastic, food and eco-towns. The process of each course involves nine steps for the students: (1) identify a trigger (e.g. a film); (2) analyse the trigger material and carry out further background research; (3) frame the problem; (4) define the specific student task and its associated success criteria; (5) identify areas for investigation to seek data; (6) find, sort and critically evaluate data to acquire relevant information; (7) apply appropriate information; (8) produce required deliverable; and (9) reflect on learning experience.		sustainable development change agents through problem-based learning.
Problem- and project-based learning; Real-world learning; Self-directed learning; Experiential learning;	**Sustainability competencies;** Project-management; Leadership; Stakeholder engagement; Facilitation skills;	The problem- and project-based learning (PPBL) in sustainability science with a strong real-world component approach is theoretically reflected and various PPBL-courses for undergraduate and graduate students at the Arizona State University, USA, are described. In all courses, students engage in small-group projects to understand and solve real-world problems. Especially interesting are PPBL-workshop-courses and PPBL-theses that were organized with stakeholders to work on future scenarios for agriculture and water in Arizona, a comprehensive sustainability policy for a city or climate change mitigation strategies in a community.	Institutional support structures for PPBL (funding, teaching assistants); Community-University liaison (e.g. a platform, an advisory board, incentives and rewards for teachers)	Wiek, A., Xiong, A., Brundiers, K., & van der Leeuw, S. (2014). Integrating problem- and project-based learning into sustainability programs.
Inquiry-based learning; Collaborative learning; Service-learning;	**Action-competence for sustainable development**; Knowledge and skills for sustainable development: identify real problems as distinct from symptoms; interpret evidence from a variety of sources;	Thesis and Group-enquiry – Students engaged in a group-enquiry research with a local community and a regeneration agency for their thesis. The task was to develop solutions in the sense of sustainable development for the problems of a small market town balancing competing drivers and demands (e.g. 'towards zero waste' or 'culture and arts as engines for regneration'). Students appreciated the applied nature of the research, working on the individual big task of a thesis within a structured environment and the possibility of knowledge exchange with peers.	Teachers initiated and facilitated the contact with the community; Monthly group meetings were tutored; Individual tutoring was offered as well; Team-teaching was used;	Ellis, G., & Weekes, T. (2008). Making Sustainability 'Real': Using Group-Enquiry to Promote Education for Sustainable Development.
Project-based learning; Self-directed learning; Collaborative learning; E-/blended learning;	**Real-world problem-solving as social changemaker;** Entrepreneurial competence; Sustainability competences;	"Changemaker MOOC" and "Yooweedoo"-competition - an example of e-learning for empowerment, social entrepreneurship and sustainable development from the university of Kiel, Germany. Students can take the changemaker MOOC (massive open online course) to learn all necessary skills and tools to develop and promote a social business (plan). Every year students can participate in a competition to get some seed funding. The jury of the competition consists of various stakeholders (university, ministry, etc.) who sponsor the competition. At the university of Kiel, the "changemaker MOOC" is integrated in blended learning courses, but it can be used individually by	MOOC; Money/Sponsors for a competition;	Presentation at workshop Vechta; http://yooweedoo.org/ https://zukunftsmacher-plattform.org/en/

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		everybody. The YooWeeDoo-project has partnerships with various other universities in order to spread the course. The MOOC is available in German and in English.		
Service-Learning; Interdisciplinary learning; Transdisciplinary learning; Collaborative learning;	**Sustainability competences** (especially system thinking, action and interpersonal competence); Creative real problem-solving; Critical thinking; Personal development; communication skills;	"Sustainability Challenge" – an inter- and transdisciplinary course organized by the Regional Centre of Expertise on Education for Sustainable Development (RCE Vienna) of four universities in Vienna, Austria, that offers students a service-learning course with group work. Students from four universities in Vienna participate in the course and are formed to interdisciplinary groups. The service-learning partners are small start-ups, small-, medium- and large companies as well as NGOs and governmental institutions. Students and partners work together on a sustainability challenge that the partner faces. Additionally to the project work, lecturers from all universities teach their expertise concerning sustainability.	Big network of business partners; Multi-stakeholder events for starting and ending; collaboration and team-teaching between universities and faculties;	Presentation at workshop Vechta; http://www.rce-vienna.at/activities/sustainability-challenge/ Biberhofer, P. and Rammel, C. (2017 forthcoming) Transdisciplinary learning and teaching as answers to urban sustainability challenges.
Service-learning; Opportunity-centered learning;	**Entrepreneurial skills;** Formulating and applying appropriate business strategies for social enterprises; Teamwork skills;	Service-learning with social enterprises – Students worked with different social enterprises as partners. The task was to generate real revenue for them through fund-raising activities. Students who had prior experience of pitching for sponsors were invited to network with the student teams and share their experiences and expertise because students had difficulties to pitch for sponsorship. Feedback from the social enterprise encouraged the students to explore new avenues.	Used a synergistic learning platform; used reflective learning logs; teachers had the role of faciliators;	Chang, J., Benamraoui, A., & Rieple, A. (2014). Learning-by-doing as an approach to teaching social entrepreneurship.
Interdisciplinary learning; Modelling; Project-based learning; Action-based learning;	**Entrepreneurial competence** (opportunity detection, business plan writing); Real-world problem-solving;	'EkoInkubátor' is an interdisciplinary module for students of economy and social studies aiming at environmental entrepreneurs at the Masaryk University, Czech Republic. Students from both faculties take courses in the respective other discipline and all together make field trips to pioneers and work together in interdisciplinary teams on environmental business plans and its implementation.	Contacts and (financial) possibilities for excursions; Collaboration between faculties;	Presentation at workshop Vechta https://www.online.muni.cz/student/2182-ekoinkubator-projekt-ktery-sblizuje-ekonomii-a-ekologii
Interdisciplinary learning; Intercultural	**Entrepreneurial competence;** Embracing knowledge, experiences and skills; Communication skills;	Non-business students from three European countries worked together in groups of five to develop initial business plans at a 10-day summer school. All activities which characterize a real venture creation were integrated - starting	warm, welcome atmosphere was provided; support came from professional	Lans, T., Oganisjana, K., Taeks, M., & Popov, V. (2013).

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learning; Opportunity-centered learning;	Problem solving; decision making; Conflict management; Leadership	with group formation and idea generation and finalizing the business ideas in a business plan with an analysis of the market demand and resources expected to be necessary. Further learning activities were the inclusion of active business people, creative workshops, case studies, company visits and group projects. Altogether, students were challenged to articulate their entrepreneurial goals and ambitions translate these into entrepreneurial projects and share these with other students. Post-course reflection revealed that heterogeneity – including disciplinary and cultural differences – contributed to learning within the groups but also caused confusion and misunderstandings.	facilitators; good to have plenty of room for unplanned activities; teachers should make the contribution of group diversity very explicit; more than minimal guidance from teachers is needed; teachers should watch for inspiring individuals in each group as team leaders;	Learning for Entrepreneurship in Heterogeneous Groups: Experiences From.
Interdisciplinary learning;	**Sustainability understanding from different perspectives** To consciously reflect on and challenge dominant intra-disciplinary ways of thinking, allowing; opening up to other disciplinary thinking and to linking different perspectives and approaches; ability to analyse, critique, evaluate, research;	The authors reflect the benefits and challenges in two interdisciplinary HESD courses. They provide a critical perspective on the widespread opinion in HESD that interdisciplinary learning is ideal for HESD because it represents the complexity and uncertainty of sustainability issues. Their experience is that some learners respond enthusiastically to interdisciplinarity, while others experience forms of 'cognitive dissonance' through the differing perspectives. They warn that exposure to new viewpoints may reinforce original perspectives, so that interdisciplinary courses need good strategies for dealing with these. The authors draw two major conclusions: 1. A "dialogue between different perspectives, discourses and methods of approaching problems" needs to be fostered; 2. "The key to interdisciplinarity is an open attitude, a willingness to learn and an ability to engage with different ways of thinking about issues" that is commonly worked on.	team teaching requires intensive communication to have a common and holistic understanding of the course; linguistic idioms of different disciplines have to be taken into account;	Feng, L. (2012). Teacher and student responses to interdisciplinary aspects of sustainability education: what do we really know?
Transdisciplinary learning; Real-world learning; Problem-based learning; Project-based learning; Collaborative learning;	**Action competence of entrepreneurs**; (project)management; Leadership; Negotiation, presentation and communication skills; opportunity recognition; understanding different roles assumed by a business owner;	3 courses of transdisciplinary learning in entrepreneurship education are presented. Course 1: Business consulting for one small business or start-up. The course consists of workshops. The assessment might be the preparation of feasibility studies, business plans, marketing plans or market research reports; Course 2: Students assume the role of marketing consultants to advise small business owners. They do research like the completion of a position audit, a competitor analysis or a customer survey; Course 3: Events with role models and guest speakers are offered so that students can interact in formal and informal settings with owners and managers. The article especially elaborates on the benefits of all involved stakeholders: students,	all stakeholders in the cooperation need to have benefits: students → learning outcomes; the small firms → advise and ideas; researchers → new scientific insights; lecturers → rewards and recognition by university	Hynes, B., & Richardson, I. (2007). Entrepreneurship education.

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	analytical and critical thinking; decision making skills;	business partners and teachers.		
Modelling; coaching; real-world learning; transdisciplinary learning;	Entrepreneurial competence (for starting own environmental business); **Personal growth;** Cooperation skills;	"Summer school EkoInkubátor" – students of the Masaryk University, Czech Republic, can stay at an eco-village for 6-days to learn for entrepreneurship in environmental agriculture. First students learn through case studies, coaching, presentations and simulations by academics and farmers as well as take part in teambuilding exercises. A project for solving local eco-farming issues follows.	partners near-by or money for students excursions;	Presentation at workshop Vechta https://www.online.muni.cz/student/2182-ekoinkubator-projekt-ktery-sblizuje-ekonomii-a-ekologii
Mentoring; Peer learning; Social learning; Identity work; Transdisciplinary learning;	**Entrepreneurial mindset and identity;** acquisition of status;	In a seven-month program for experienced adults, each participant was assigned a national or international entrepreneur as mentor. The participants had monthly half day meetings with their mentors during which milestone actions were discussed and recorded on a central document system. The conversations were meant to be reflective, challenging and supportive. The mentor's role was to act as a sounding board and source of challenge, but explicitly not to be a business advisor. The program further included a series of day seminars, and formal bi-weekly one-to-one meetings with the incubation center manager. Participants had to present to monthly "stress-test panels". Additionally peer learning between the participants was particularly fostered during meetings. The program was very successful in terms of new ventures, but also in terms of the mentoring system. Many participants continued the mentoring.	availability of an incubation center and meeting space; big network of entrepreneurs;	Rigg, C. & O'Dwyer, B. (2012). Becoming an entrepreneur: researching the role of mentors in identity construction.
E-/blended learning; Self-directed learning; Project-based learning; interdisciplinary learning;	**Sustainability competences** (understanding sustainability issues); **Entrepreneurial competence** (Creative and critical thinking, thinking outside the box); Real-world problem-solving; Project- and time-management; Communication and presentation skills;	"Virtual Academy on Sustainability and a changemaker project" – a blended learning course at the university of Vechta, Germany, for students from all disciplines. At the beginning, students are prepared to choose from and work with the online lectures of the 'Virtual Academy Sustainability' which offers lectures, learning materials and exams on 15 sustainability topics. At the end of the semester, there are two blocked sessions (each lasts one weekend) where student groups develop sustainability-driven business plans supported by a MOOC. The self-learning is assessed by learning diaries and the project work in groups by three individual, reflective assignments concerning the group work experience.	Online resources; assessment via learning diaries;	Presentation at workshop Vechta; http://www.va-bne.de/ MOOC: https://zukunftsmacher-plattform.org/en/;

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Virtual learning; Blended learning; Self-directed learning; Intercultural learning; Interdisciplinary learning; Problem-oriented learning;	**Learning for sustainable development;** to deal with differing and critical perspectives on SD; becoming conscious of personal 'blind spots'; intercultural setting of the seminar increased students' motivation; online-interaction takes a lot of time; discussions are profound and focused;	Three e-learning courses in HESD are described. 1. The first course established a dialogue between students form the North and from the South to discuss different perspectives on sustainability-related topics. 2. An interdisciplinary course performed a systems analysis of a complex problem and used a wiki as knowledge management system. 3. A blended learning course in 'sustainable humanities' fostered project management using an online-platform. The group processes were monitored and supported through feedback on weekly minutes that had to be uploaded by the groups.	It is difficult to keep the balance between control and student ownership in the self-directed online studies; there are various commercial or open source platforms to support e-learning courses;	Barth, M., & Burandt, S. (2013). Adding the 'e-' to Learning for Sustainable Development: Challenges and Innovation.
Value-based learning; Reflective learning; Experiential learning; Project-based learning; 'Practical Organizational Behavior Education';	**Marketing competence with sustainability focus;** Development of a moral, ethical, and perceptual foundation; Critical thinking; Real world problem-solving; Personal development; Social responsibility; Increased interest in sustainability;	Two courses on sustainable marketing emphasized value-based learning. Students explored the values, ethics, morals, and marketing skills of non-profit, social service and social enterprise organizations. In course 1, students first learned foundations of sustainable development and then engaged in discussions of marketing practices at nonprofit organizations. The activities included various meetings with representatives of programs or local organizations and the development of a marketing plan for an own nonprofit organization. Course 2 started classroom session to set foundations. Next students had a two-week study abroad trip to visit nonprofit organizations of international relevance. Afterwards they do a marketplace analysis of marketing and sustainable development issues of these. Additionally, students kept personal journals throughout the course.	The authors suggest several graded activities and assessments like online discussions, reflective assignments, self-assessments, or a final project work in groups; Funding and contacts for excursions and meetings with organizations are necessary;	Markley Rountree, M, & Koernig, S. K. (2015). Values-Based Education for Sustainability Marketers Two Approaches for Enhancing Student Social Consciousness.

TABLE 11: RECOMMENDED TEACHING AND LEARNING APPROACHES WITH GOOD PRACTICE EXAMPLES

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3.4.3 Recommended teaching methods with good practice examples

Teaching method	Competence development and learning outcomes	Good Practice description	Aspects for implementation	Source
Systemic constellation work	**System thinking competence**; Empathy; Tolerance for uncertainty and ambiguity;	Systemic constellation work is traditionally used in family therapy settings. But it can also be used to visualize or experience tensions and dynamics in all kind of systems: organizations, society, eco-systems. Different systems can be combined. And even abstract decision premises can be introduced into the systems so that their effect can be observed. With this method students experience and feel dynamics as well as tensions in groups or sustainability-oriented business decisions. A constellation work can also be part of a stakeholder or network analysis.	Teacher needs experience and expertise in systemic constellation work;	CASE Workshop facilitation, Vechta 2015; Müller-Christ, G., & Liebscher, A. K. (2015). Advanced Training for Sustainability Change Agents–Insights and Experiences from a Seminar Series Using the Method of Systemic Constellations.
Fishbanks - a Renewable Resource Management Simulation	**System-thinking competence, HESD**;	The Fishbanks, ltd. is a computer-assisted simulation game aiming to change unsustainable mental models of its participants. It provides a scenario of managing a fishing company seeking for the highest profit in the world of limited, even if renewable sources. It has been developed by prof. Dennis Meadows and it is based on a theory of education for system thinking that combines some of the principles of experiential and transformative learning.	There is an online-version of the simulation available which only needs registration of the lecturer. Further explanations of the method and teachers guidance are provided online as well as links to other simulation games, too. Another simulation game is that of Stratagem in which a sustainable economy has to be created.	MIT Sloan School of Management (2016). https://mitsloan.mit.edu/LearningEdge/simulations/fishbanks/Pages/fish-banks.aspx
Scenario analysis	**System thinking competence and anticipatory competence, HESD;** dealing with uncertainties and thinking proactively; using, shaping, handling and sharing different sets of information; Critical thinking;	The scenario analysis was used to foster sustainability competencies and knowledge of a specific case in a self-directed, collaborative and problem-oriented learning setting. Qualitative and quantitative data from various sources (science, stakeholders, etc.) have to be integrated to develop a scenario under conditions of uncertainty. Students draw pictures of the future. They have to reflect on norms and values for the future and have to take into account various trends. The students developed qualitative scenarios for the tourism in a German region in the year 2050 under the influence of climate change. One	Use of a Wiki for sharing complex knowledge; Interdisciplinary collaboration involves extensive negotiation processes between students which can be perceived as exhausting;	Burandt, S., & Barth, M. (2010). Learning settings to face climate change.

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		step was to create scenarios, another to analyze, discuss, evaluate and compare the different ones to foster critical reflection.		
Reading and writing for critical thinking (RWCT)	**Critical thinking; Plurality; thinking in global context;**	Reading and writing for critical thinking – comprises many concrete, practical methods, techniques and strategies. They are integrated into an open but compact system which aims at developing critical thinking and supports active learning processes. It is based on constructivist pedagogy and builds on the principles of physiological functioning of the human brain which is reflected in the three-stage learning model of E-R-R: Evocation – Realization of meaning – Reflection.	Many examples of putting the RWCT methods into practice within global education are available at the website of NaZemi. An example of its application on the topic of degrowth at economy and society trust is provided online, too, including teaching and studying materials from the course 'Degrowth and Local Economic alternatives'.	Critical Thinking International (2016); NaZemi (2016); Economy and Society Trust (2016);
Ecological Footprinting	**Normative, strategic and personal competence, HESD;** reflections on reasons and implications for the 'heaviness' of footprints; strategic competence; actions to reduce footprints; considerations about the need for societal change;	Ecological Footprinting – the calculation of the personal ecological footprints has been used as a means to challenge students to consider the sustainability of their lifestyles and to learn about sustainability.	Ecological Footprint Calculators are a simple and readily available tool online; in order to avoid potential feelings of powerlessness and apathy the tool should be used combined with a wider set of learning and change strategies;	O'Gorman, L., & Davis, J. (2013). Ecological Footprinting: Its Potential as a Tool for Change in Preservice Teacher Education.
Sustainability Business Model Canvas (developed by Ambros, M. & Schmitz, D., 2014); Case clinic; Pitching;	**Strategic competence, HEE**: innovation management; normative competence: embracing diversity and interdisciplinarity;	"Sustainable Business Model Canvas" – a core method within an interdisciplinary, action-oriented project course at the University of Natural Resources and Life Sciences, Vienna, Austria. In teams, students take the steps of idea generation, business case development, business plan development and prototyping. They also make excursions to pioneers of sustainability-driven entrepreneurship and deliberating spaces like incubators and co-working spaces. Where students (mostly in a team) develop sustainability-oriented business plans using an adapted version of the well-known Business Model Canvas. Some students (ca. 20%) even implement their business idea.	Duration of 2 semesters; Teachers need good facilitation and coaching skills, basic business knowledge, and ideally entrepreneurial experience	Presentation at CASE workshop Vechta 2015; Based on http://www.businessmodelgeneration.com/ http://www.sustainicum.at/en/home
(Competence) assessment through case analyzes in HESD	**Sustainability competencies;** Problem-solving skills; interdisciplinary perspective; understanding stakeholder interests and relationships; making decisions under uncertainty;	In an introductory, interdisciplinary course to sustainability, case studies with a real-world orientation were analyzed throughout the semester. This was done in groups in weekly breakout sessions that accompanied a lecture and readings. A final group project consisted of analyzing and proposing solutions to a real-world sustainability problem. In line with the learning activities during the semester, the assessment was designed as a case analysis as well. The students' responses were analyzed concerning system thinking skills and conflict	Case study material is needed;	Remington-Doucette, Connell, Armstrong, & Musgrove (2013)

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		resolution. The assessment material is provided in the annex of the article.		
Pitching; Role models; Mentors; Networking events;	**Interpersonal competence, HEE;** Communicative skills; Improving business idea development; acting and thinking like entrepreneurs;	Business idea development and pitching – Students develop business ideas through pitching in various formats. The idea of pitching is to present your (business) idea briefly and convincingly to your audience and to get feedback on it. The course is designed as an experiential learning experience that furthermore uses guest speakers, mentors and networking events. The article provides details concerning basic entrepreneurial knowledge (with hints for literature) and course textbooks taught and used in the course.	peer-assessment; teams have to be built up by students themselves but with certain requirements concerning the composition;	Bliemel, M. J. (2013). Getting Entrepreneurship Education Out of the Classroom and into Students' Heads.
Teambuilding exercise 1: "Starting a rocket at the right time"	Interpersonal competence: **Detect, analyze, understand and reflect errors in group behavior/dynamics;**	The facilitator asks the group to form a circle with him/her. He/she explains that the group has to start a rocket and that punctuality and accuracy are very important for a successful start. He/She further explains that he/she will count down from 5 to 1 and then all together have to "press the start button" (clap with the hands). When everybody is ready, he/she starts to count down, but instead of counting "1", he/she hesitates shortly and then directly claps his hands. Normally the whole group follows his/her example, thus failing to follow the right time order for the start. For the debriefing the facilitator asks for reasons of the failure: • Wrong behavior of the leader and everybody follows/wrong role models • Expectations leading to wrong behavior • Time pressure • Being afraid of doing it wrong/different than the others • Stronger focus on behavior than the words of the facilitator/leader/role model	Facilitator should be very clear about his sentences and performance (try it before with at least some persons); The debriefing can be transferred to theory of group dynamics, to self-reflection or to problems a team is currently facing in reality; A good debriefing/reviewing is essential in experiential learning – e.g. support from Roger Greenaway can be found online or in his short article "The Art of Reviewing" (2002).	CASE Workshop Brno 2016
Teambuilding exercise 2: "The Helium Stick"/	System thinking competence; Interpersonal competence: Teambuilding; **Experience failure and deal with it as a group;** Detect, analyze, understand and reflect errors in group behavior/dynamics;	For the Magic Stick exercise the group has to line up in two rows facing each other. Everybody puts the two index fingers into the middle, parallel to each other. A long "helium stick" is laid on the fingers. The task is to bring the stick to the ground while the two index fingers of all persons are in touch with the stick for the whole time. The challenge: By "magic" the stick is always going up instead of down. The exercise is very difficult and might end in failure causing frustration. A debriefing is necessary. It might address feelings in the group, an analysis of the difficulties, problem-solving strategies, communication, roles and leadership in the group.	A long magic stick and space for the group to line up. Time for debriefing. The debriefing should have a clear focus depending on the aim why the exercise was introduced (working on failure, on leadership and communication in the group or on role behavior)	CASE Workshop Vechta 2016; Based on http://wilderdom.com/games/descriptions/HeliumStick.html; Meadows, D., & Sweeney, L. (1995). The systems thinking playbook I-III. Exercises to Stretch and Build Learning and Systems Thinking Capabilities.

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Teambuilding exercise 3: Role reflection in teams	Interpersonal competence: Teambuilding; **Understanding different team roles and their function**; Being able to reflect on the own and others team role;	A simple method to stimulate reflection on roles within a group is to briefly introduce three prominent roles in groups: 1. leader/manager - Bulldozer, 2. experts - Submarine, 3. team player – Ambulance. Pictures of the three roles can be laid on the floor in a triangle and the group members are asked to position themselves within the space of these three poles. Then reflective questions can be asked: How do you perceive the distribution of roles in your group? Who would like to change his/her role? Who is not feeling comfortable with the situation? What is needed? How could other team members help to ameliorate the situation?	The educator should have some background knowledge on team roles; A good debriefing/reviewing is essential in experiential learning	Support from Roger Greenaway can be found online or in his short article "The Art of Reviewing" (2002).
Earth Walk activities	Personal competence; **(Environmental) awareness;** creativity; perspective-taking;	Earthwalks - they aim at increasing environmental sensitivity or just at enjoying nature. New perspectives and small challenges may enhance creativity and curiosity. Participants can be asked to detect small insects, to collect materials of different qualities (e.g. dry and wet) or to walk with a mirror in front of them, thus observing the sky instead of the path when walking.	A good debriefing/reviewing is essential in experiential learning – e.g. support from Roger Greenaway can be found online or in his short article "The Art of Reviewing" (2002).	Hoessle, K., & Van Matre, S. (1980). Earth Magic. Further source for outdoor education: Martin, A., Franc, D., & Zounkova, D. (2002). Outdoor and experiential learning. A holistic and creative approach to programme design.

TABLE 12: RECOMMENDED TEACHING METHODS WITH GOOD PRACTICE EXAMPLES

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3.5 Summary of the recommended pedagogical framework for the master program

What was given in the proposal?

Starting with the proposal, some pedagogical and didactical approaches were already recommended from the beginning on and should be underlined (see Figure 11). In the master program, classes should consist of students from multiple disciplines. As well, courses should be offered by teachers from different disciplines. The learning should explicitly work with this diversity of knowledge and backgrounds, discuss various disciplinary perspectives on topics or strategies, integrate them and thus be **interdisciplinary**. The academic learning should open up for knowledge and needs of society by fostering the co-creation of knowledge in **transdisciplinary** learning approaches. In the master courses students should work on **projects** in forms of **university-business cooperation**. Learning partners from the business world can function as role models for the students and can also provide cases of real-world challenges that students might face later in their career. During the master program students should not only acquire relevant skills and competences for **developing new sustainability-driven start-ups**, but should already get guidance to start such developments during their studies.

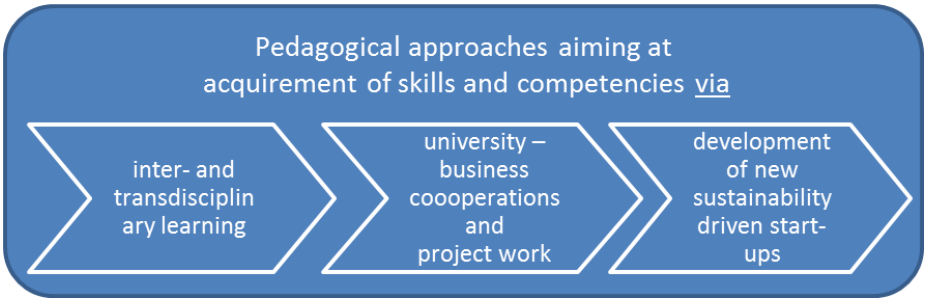

FIGURE 11: PEDAGOGICAL FRAMEWORK FOR THE MASTER PROGRAM AS OUTLINED IN THE PROJECT PROPOSAL

What can further be added?

The **competence-orientation** should be highlighted in the pedagogical framework. The master program shall foster competence development, thus increasing the potential of students to perform according to their knowledge in the real-world. Competence-oriented teaching and learning comprises active, learner-centered and experiential learning. Furthermore the **learning to learn** should be developed. Entrepreneurship itself can be defined as a process of continuous, self-organized learning. Therefore, students should learn on a meta-level how they learn and how they can improve organizing their learning process. As two strategies, we recommend that students learn to learn in and from peer groups as well as with mentors in self-directed and reflective learning processes. The **real-world orientation** should be represented throughout the curriculum. Various types of project work in different inter- and transdisciplinary settings should be part of the master program. The importance of role models should be emphasized, too. Many aspects of an entrepreneurial mindset or an entrepreneurial identity are difficult to develop by oneself, but can more easily be copied and adopted from watching **role models** – this might be the habitus or the attitude towards risk and failure of an entrepreneur. Since the decision to create a start-up and to become a sustainability-driven entrepreneur involves all other areas of life plans and therefore also is a question of identity management, we strongly recommend offering **coaching** to the students. Less personal, but more technically oriented coaching might also be useful as support and guidance for the development of sustainability-driven start-ups during the program. Individual and group coaching should be used so that students can learn from each other but can

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also get support and feedback tailored to their individual needs. The recommendations for the pedagogical framework are summarized in Figure 12.

FIGURE 12: ADVANCED PEDAGOGICAL FRAMEWORK FOR THE MASTER PROGRAM

To conclude

Here, we "only" recommend a general pedagogical framework (Figure 12) determining the dominating teaching and learning approaches in the master program. In the result section (chapter 4), we give some concrete recommendations for major tasks and assignments in each semester (like having a group service-learning project in semester one and two with a more conceptual, research-oriented first phase and a more action-oriented implementation phase in the following semester). But for further details of the program, we only make suggestions concerning teaching and learning approaches as well as concrete teaching methods. And we provide sources of good-practice examples that illustrate our idea of the course and give orientation for teachers who want to follow our ideas. This way, we hope to assure certain comparability or similarity of the master program provided at different universities in Europe and at the same time we give credit to the diversity and specialties of regional conditions, special interests and expertise of a university as well as resources and teaching experiences of the various teachers that will be involved in the program. Universities and teachers should feel free to adapt the master program to their needs, but they should maintain its core characteristics. And as a last advise: When adapting the CASE master program in terms of teaching and learning methods the person should keep in mind that it is "important to consider the micro-level of a single course, but also (…) the macro-level of the curriculum, and how the different courses contribute to the bigger picture of a program" (Barth, 2015, p. 96).

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4. Results

Following, we outline the master program and its modules. A macro-perspective provides the summary of the thematic blocks and the pedagogical framework and an overview of all modules (ideally) structured as a master program. A micro-perspective provides more detailed descriptions of each module and its associated courses in terms of contents to be addressed and adequate methods to be used.

4.1 Macro-perspective of the CASE master program

In WP 3 (p.15ff) and WP 4 (p. 33ff) of the CASE project, a thematic and pedagogical outline for a master program on sustainability-driven entrepreneurship was developed that can be offered to as many European universities as possible. Figure 13 summarizes the results concerning the thematic blocks and the pedagogical framework for the master program. The aim with the study program is to empower students to tackle complex regional, but at the same time global, sustainability issues in an entrepreneurial way. Entrepreneurial means that students have developed competencies for creating and developing a business plan for a particular business or project within a company. They should be able to sustain themselves by what they do, while making a difference and having an impact on the economy and society to become more sustainable. At graduation, we want our future students to be ready to start as sustainability-driven entrepreneurs and to implement their ideas. That is why the master program will be explicitly competence-, not only knowledge-oriented. Therefore, we were looking for teaching and learning methods that foster sustainability and entrepreneurial competencies like anticipatory thinking, creativity, opportunity-detection, strategic action competence and interpersonal, communication skills. The master is foremost real-world, not scientifically oriented. As entrepreneurs, students will address complex real-world sustainability problems within a business setting. So, we need to have learning settings where students get in touch with the world outside university as in service-learning projects with business partners or NGOs. That is one example how students can learn in a self-directed manner, in an inter- and transdisciplinary setting and through exchange with peers, mentors and role models.

FIGURE 13: OVERVIEW OF THE THEMATIC BLOCKS AND THE PEDAGOGICAL FRAMEWORK IN THE MASTER PROGRAM

To make the outline concrete, the six thematic fields are organized in 16 modules for a two-year master program with 120 ECTS. The learning steps are structured in a logic time order. The first two semesters include all basics for a sustainability-driven entrepreneur. The second year fosters the development of an own sustainability-driven start-up and allows for specialization in disciplines and regions through choosing an exchange university and a topic for the thesis. Figure 14 is a graphical overview of the master program showing the modules and courses of which the master program consists. The colors represent the six thematic fields.

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CASE
Competencies for a sustainable socio-economic development

CASE-Master program on Sustainability-driven Entrepreneurship					
Target: Fostering competencies for sustainability-driven Enterpreneurship to support a sustainable socio-economic transformation in society					
Target Group: All students interested in Sustainability-driven Entrepreneurship/Intrapreneurship					
	Bridging courses				ECTS
Semester 1	1.1 Transformation and Sustainability	1.2 Sustainable Economy	1.3 Interactions in multi-scales	5.1 Personal Development and coaching 1	30
	Transformation and Sustainability	Sustainable Economy	Interactions in multi-scales		
	First Week Challenge - Defining 'Sustainability-driven Entrepreneurship'	Excursions to Pioneers	Regional Sustainability Challenge - 1/2		
		Methodology and Tools 1	Methodology and Tools	Creativity and opportunity detection	
Semester 2	3.1 Pioneers of Sustainability: Intra- and Entrepreneurship	3.2 Sustainable Organisation and Management	2.1 Processes and Managment of Innovation	5.2 Personal Development and coaching 2	30
	Pioneers of Sustainability: Intra- and Entrepreneurship	Sustainable Organisation and Management	Processes and Managment of Innovation		
			Methods on innovation management	Development of sustainable business idea and model	
	Impact	Finance	2.2 Regional Sustainability Challenge 2/2		
Semester 3	4.1 New institutional settings and Mulistakeholder networks	6.1 Elective Courses for specilization	6.2 Regional Hot Spots and thematic challenges	5.3 Personal Development and coaching 3	30
	New institutional settings and Mulistakeholder networks	Elective Courses for specilization *OR* *Internship*	Regional Hot Spots and thematic challenges	A week of fear and failure	
				Developing a Sustainable Business Plan	
Semester 4	4.2 Mulistakeholder conference	6.3 Internship	5.4 Master Thesis		30
	Mulistakeholder conference	Internship *OR* *Elective Courses for specialization*	Master Thesis		

FIGURE 14: OVERVIEW OF THE MODULES AND COURSES OF THE SIX THEMATIC BLOCKS IN THE MASTER PROGRAM (COPY OF FIGURE 7 P.19)

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4.2 Micro-perspective on the 16 modules of the CASE master program

All 16 modules are outlined concerning their workload, contents, and a suggested course structure with adequate teaching and learning methods. The module descriptions show how content and methods can be combined in order to foster entrepreneurial and sustainability competencies. The workload and course structure of the modules are suggestions and can be adapted to the local conditions and needs of European universities which want to implement the master program or parts of it. For each module, we give examples of courses at the CASE partner universities which already teach contents or use methods of the module. We also suggest articles which describe in more detail similar courses or teaching and learning methods and therefore serve as guidance for teachers who want to adopt a module. Sometimes, we also give hints for further sources such as basic books, toolboxes, knowledge platforms etc. that may serve as support for teachers implementing the courses.

Title of Module	**1.1 Transformation and Sustainability**			
Type	mandatory/compulsive			
Workload	7,5 ECTS-points			
Contents	The starting point of module 1.1 should be a **first week challenge** aiming to define "sustainability-driven entrepreneurship" together with the students and relevant stakeholders of the program. The week shall provide an introduction for the particular setting within the frame of self-directed, collaborative, inter- and transdisciplinary learning and teaching of the master program. The second part of the module focuses on great transformations in history and today, transformation processes in general as well as global trends and challenges focusing on sustainability as a science. In general the modules shall aim at • pluralistic approaches towards transition and transformation concepts including a critical reflection process, • understanding and learning from history, different cultures and values.			
Course	**Format**	**Main pedagogical approaches**	**Suggested teaching methods**	**Suggested assessment**
First week challenge 2,5 ECTS	block seminar	experiential learning; collaborative learning; project-based learning; outdoor learning;	1-week-excursion for intensive group experience; activities for group dynamics and teambuilding from experiential education; team work on sustainability challenge; excursions to or guests from regional sustainability-driven enterprises and start-ups;	reflective essay/ learning report;
Transformation and Sustainability 2,5 ECTS	lecture	interdisciplinary learning; transdisciplinary learning; problem-based learning; collaborative learning;	case study analysis with guest speakers from regional and international enterprises and organizations; visiting congresses and conferences; back- and forecasting; simulation–tools; discussions;	graded case study analysis;

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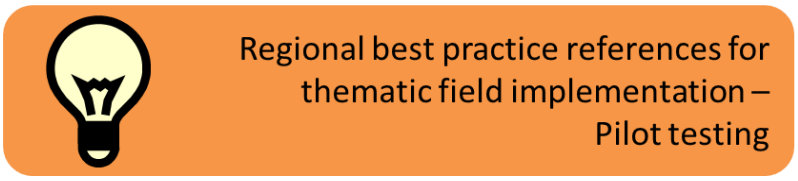
Understanding processes of transformation for sustainable development 2,5 ECTS	seminar	problem-based learning; inquiry-based learning; experiential learning;	case study analysis of historical transformations; scenario analysis; future workshop; back- and forecasting; simulation–tools; group discussions;	presentation of a case study;



Courses:

- First Week Challenge/Region Brno/ Autumn Semester 2016
- Ecological Economics (Nada Johanisová)/Region Brno/ Autumn Semester 2016
- Parts of Actors and Spaces for change/ Region Vienna/ Summer Semester 2016/Winter Semester 2017

Literature:

First week challenge

- Students engage in alternative communities to experience a sustainable way of living "close to nature" which provides a fruitful context to reflect theories of sustainability:
  Cook, R., & Cutting, R. (2014). 'Low-Impact Communities' and Their Value to Experiential Education for Sustainability in Higher Education.
- Critical reflection on the benefits and challenges of interdisciplinary learning (including team-teaching), HESD:
  Feng, L. (2012). Teacher and student responses to interdisciplinary aspects of sustainability education: what do we really know?

Transformation and sustainability

- Interdisciplinary, learner-centered and value-based learning to integrate sustainability learning with professional field and other disciplines, HESD:
  Hegarty, K., Thomas, I., Kriewaldt, C., Holdsworth, S., & Bekessy, S. (2011). Insights into the value of a 'stand-alone' course for sustainability education.
- Assessment task with problem-based learning on case-studies of wicked sustainability problems (with linkage to economy), HESD:
  Dobson, H. E., & Tomkinson, C. B. (2012). Creating sustainable development change agents through problem-based learning.
- Assessment of competence development through case analyzes, HESD:
  Remington-Doucette, S. M., Connell, K. Y. H., Armstrong, C. M., & Musgrove, S. L. (2013). Assessing sustainability education in a transdisciplinary undergraduate course focused on real-world problem solving.

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Understanding processes of transformation for sustainable development

- Tutored group-enquiry to work on sustainable solutions for a local community's problems, HESD: *Ellis, G., & Weekes, T. (2008). Making Sustainability 'Real': Using Group-Enquiry to Promote Education for Sustainable Development.*
- Scenario-analysis concerned with climate change, HESD: *Burandt, S., & Barth, M. (2010). Learning settings to face climate change.*

Further sources:

- A Toolkit for Education for Sustainable Development: http://www.esdtoolkit.org/esd_toolkit_v2.pdf
- Sustainicum Collection - A collection of teaching methods in the field of sustainability: http://www.sustainicum.at/en/home
- Case studies of wicked sustainability problems: http://www.globalee.net/case-studies.html
- Johnson, D. W., & Johnson, F. P. (2006). Joining Together. Group Theory and Group Skills.
- Priest, S. & Gass, M.A. (2005). Effective Leadership in Adventure Programming.
- Prouty, D., Panicucci, J., & Collinson, R. (2006). Adventure Education. Theory and Applications. Project Adventure.

Title of Module	**1.2 Sustainable Economy**			
Type	mandatory/compulsive			
Workload	7,5 ECTS-points			
Contents	**Responsible Economy** Alternative economic strategies and concepts of the economy will be introduced as good practice examples e.g. a circular economy and regional cycles or sharing instead of owing, or the degrowth or post growth movement. The concept and role of a responsible economy, relevant actors and markets concerning supply and demand as well as the role of niches can be deconstructed via various thematic fields such as ethics and values, common welfare, prosperity, quality of life, responsibility of consumers and producers and amongst others resilience. The module deals with the question of "*How sustainability-driven entrepreneurship may contribute to a resilient and a circular economy*". Normative conflicts and ideological aspects are discussed as specific challenges in the context of sustainability-driven enterprises. **Excursions to Pioneers** To understand the relevance of a sustainable economy and the need of alternative economic strategies students will meet and visit **pioneers** in the field of sustainability-driven entrepreneurship. Likewise they can be seen as **role models**, activators and foster real-life feedback via their practical examples. Students shall get to know and learn from various active sustainable entrepreneurs and their approaches. **Methodology and Tools 1** Main parts of module 1.2 as well as module 1.1 are based on the understanding of concepts and therefore need to be combined with a methodology and tools course where students acquire skills for critical analysis of texts - **academic reading** - and the creation and presentation of scientific texts - **academic writing**. The focus of this part of the module should be on critical thinking skills.			
Course	**Format**	**Main pedagogical approaches**	**Suggested teaching methods**	**Suggested assessment**
Responsible Economy	lecture or seminar	experiential learning; collaborative learning;	simulation games like fish banks or climate	graded essay on a topic of responsible economy;

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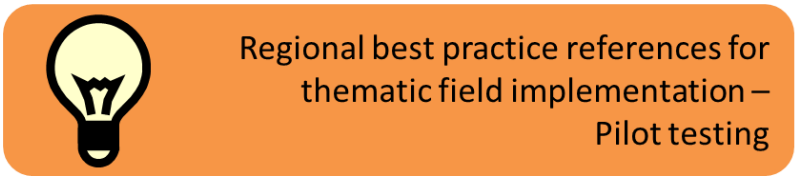
2,5 ECTS			conferences; discussions and debates; flipped classroom;	
Excursions to Pioneers 2,5 ECTS	seminar	experiential learning; collaborative learning; transdisciplinary learning; social learning through role models;	excursions; workshops with guests;	three reflective reports on visited pioneers;
Methodology and Tools 1: academic reading and writing 2,5 ECTS	tutorial	experiential learning; collaborative learning;	reading and writing for critical thinking; text analysis; discussion; review writing;	review of a research paper;



Courses:

- Socially sustainable degrowth (Christian Kerschner)/Region Brno/ Autumn 2017
- Actors and Spaces for change/ Region Vienna/ Summer Semester 2016/Winter Semester 2017
- Peter Vandor/Rudolf Dömötör/NPO Center/Region Vienna (tbc)
- Academic reading and writing (Bohuslav Binka, Jan Činčera,Jan Skalík)/Region Brno/ Autumn Semester 2016
- Introduction to academic writing, Bachelor ein economics and social science, Unibz
- Ecosocial economy, Master in Ecosocial Design, Unibz

Literature:

Responsible economy

- Two courses following principles of active learning and problem-based learning in the field of responsible economy are described in detail, HESD in business:
  MacVaugh, J., & Norton, M. (2012). Introducing sustainability into business education contexts using active learning.
- Problem-based learning on case-studies of wicked sustainability problems (with linkage to economy), HESD:
  Dobson, H. E., & Tomkinson, C. B. (2012). Creating sustainable development change agents through problem-based learning.
- Ecological Footprinting, HESD:
  O'Gorman, L., & Davis, J. (2013). Ecological Footprinting: Its Potential as a Tool for Change in Preservice Teacher Education.

Further sources:

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- Doughnut Economics
  Kate Raworth (2012). http://www.kateraworth.com/doughnut/
- CASIPEDIA-Website for case studies, mapping of sustainable innovation initiatives
  http://www.casi2020.eu/casipedia/cases/

Title of Module	**1.3 Interactions in multi-scales**			
Type	mandatory/compulsive			
Workload	7,5 ECTS-points			
Contents	**Interactions** are reflected via a **multi-scale perspective**, beyond the traditional micro-macro perspective and in a way to overcome such dualism and relate **globalization** in terms of grand challenges (multiple crises, differences, value chains) to **regionalization** processes such as sustainable regional-, urban-, rural- and community development, value chains, regional cycles/cycle economies. The implementation of transformative concepts on local entrepreneurial level and its effects on the global scale shall help to bridge the dualistic perspective and help students to interlink various scales and their effects on each other. The module helps students to understand that regional action has an effect on the global scale. In particular this module aims at bridging theory and practice in the context of socio-ecological transformation. Students are encouraged to use their creativity, experiences and knowledge in order to develop their own particular transformation project in the regional context and create solutions for **regional sustainability challenges**. The module offers students the opportunity to understand different perspectives of sustainability via an experience based learning approach/service learning method. Together with partners from practice (e.g. businesses, NPOs, city department) projects are designed and create solution concepts for practical challenges of the partners working environment. **Methodology and Tools 2** Also module 1.3 should be combined with a methodology and tools course focusing on tutoring and coaching for project management, research tools from sustainability science and methodology of social science. The aim of the course is to contribute to the ability of students to define their own research project/service learning projects.			
Course	**Format**	**Main pedagogical approaches**	**Suggested teaching methods**	**Suggested assessment**
Interactions in multi-scales	lecture	interdisciplinary learning; problem-based learning; collaborative learning;	case studies; Flipped/inverted classroom; role plays; discussions;	active participation
Regional Sustainability Challenge - 1	seminar	service-learning; project-based learning; problem-based learning; transdisciplinary learning; collaborative learning; inquiry-based learning;	Regional service-learning project in teams on the impact of regional actions on global levels (and vice versa); Regional service-learning project in teams and with a business partner to identify sustainability challenges and conceptualize a S-L-project; coaching;	graded project report; learning diaries, project presentation
Methodology and Tools 2: project management, research methodology and tools	tutorial	problem-based learning; experiential learning; training;	coaching and training on project management e.g. with dragon dreaming, facilitation and presentation skills, interview techniques, questionnaire development etc.;	active participation

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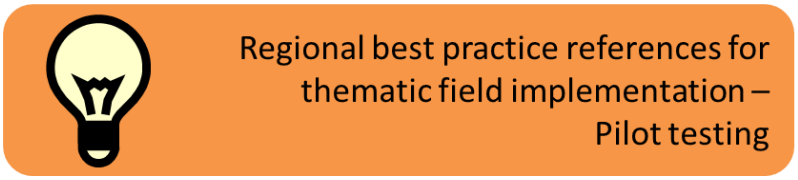

Courses:

- Sustainability Challenge (conceptualization phase)/Region Vienna Summer Semester 2016/Winter Semester 2016/17
- Service Learning Course, Seep Master Program/Region Vienna
- Participatory research with people of the region/Region Vechta/Summer Semester 2016
- Service Learning projects with social enterprises//Region Vechta/Winter Semester 2016/2017
- Methodology /Region Brno/Autumn 2016 and Spring 2017
- Action research and transformative research, PhD level, Unibz
- Competencies for a sustainable economy, Studium Generale, Unibz

Literature:

Interactions in multi-scales:

- Ecological Footprinting, HESD:
  O'Gorman, L., & Davis, J. (2013). Ecological Footprinting: Its Potential as a Tool for Change in Preservice Teacher Education.
- Interdisciplinary, learner-centered and value-based learning to integrate sustainability learning with professional field and other disciplines, HESD:
  Hegarty, K., Thomas, I., Kriewaldt, C., Holdsworth, S., & Bekessy, S. (2011). Insights into the value of a 'stand-alone' course for sustainability education.
- Assessment of competence development through case analyzes, HESD:
  Remington-Doucette, S. M., Connell, K. Y. H., Armstrong, C. M., & Musgrove, S. L. (2013). Assessing sustainability education in a transdisciplinary undergraduate course focused on real-world problem solving.

Sustainability Challenge 1:

- Students conduct community service-learning projects in groups that respond to local issues, HESD:
  Van Wynsberghe, R., & Moore, J. L. (2014). UN decade on education for sustainable development (UNDESD): enabling sustainability in higher education.
- Various problem- and project-based courses in HESD with stakeholder engagement, HESD:
  Wiek, A., Xiong, A., Brundiers, K., & van der Leeuw, S. (2014). Integrating problem- and project-based learning into sustainability programs.
- Interdisciplinary, learner-centered and value-based learning to integrate sustainability learning with professional field and other disciplines, HESD:
  Hegarty, K., Thomas, I., Kriewaldt, C., Holdsworth, S., & Bekessy, S. (2011). Insights into the value of a 'stand-alone' course for sustainability education.

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- Tutored group-enquiry to work on sustainable solutions for a local community's problems, HESD:
  Ellis, G., & Weekes, T. (2008). Making Sustainability 'Real': Using Group-Enquiry to Promote Education for Sustainable Development.
- Critical reflection on the benefits and challenges of interdisciplinary learning (including team-teaching), HESD:
  Feng, L. (2012). Teacher and student responses to interdisciplinary aspects of sustainability education: what do we really know?
- Opportunity-centered learning for business idea and plan development in disciplinary and culturally heterogeneous groups, HEE:
  Lans, T., Oganisjana, K., Taeks, M., & Popov, V. (2013). Learning for Entrepreneurship in Heterogeneous Groups

Titel of Module	**2.1 Processes and Management of Innovation**			
Type	mandatory/compulsive			
Workload	5 ECTS-points			
Contents	In the beginning of module 2 an introduction of the core understandings of innovation management and in particular sustainability-oriented innovation are provided from an interdisciplinary theoretical and historical perspective. Concepts such as social-, eco- and institutional innovation as well as their interlinkages to sustainability-driven start-ups are analyzed. As this is quite a new field, the main focus will be on individual pioneers and their values, goals, motivations and skills. Students will learn from potential role-models and their business models, which are based on particular mind-sets and values, guiding an innovative process in order to find entrepreneurial solutions to societal problems. In general, this module asks for a practical approach fostering creativity as sustainability-driven entrepreneurship is in essence the realization of sustainability innovations (societal, environmental and institutional) aimed at the mass market and providing benefit to the larger part of society. In particular, this module will emphasize on the understanding and testing of methods on sustainability innovation management in practice. Sustainability innovations, seen as the recombination of existing ideas in new and novel ways, will be of interest, but also actual innovations, which are not only a recombination. Practical examples will help students to understand the difference about change and improvement connected with the theoretical framework of disruptive or path-breaking innovation vs. incremental change and innovation. Beside startups, the aspects of intrapreneurs, who learn and create innovations and substantial change inside/from within a company, is also considered, as not every student will be an entrepreneur after graduating from the master program. From this perspective graduates will learn about potentials of transforming particular sectors and helping to change branches as important actors of change management for enterprises and society.			
Course	**Format**	**Main pedagogical approaches**	**Suggested teaching methods**	**Suggested assessment**
Processes and Management of Innovation 2,5 ECTS	lecture	problem-based learning; intercultural learning;	case study analysis of innovation processes in different fields (energy, agriculture etc.); excursions; group discussion; e-exchange between regions;	graded case study analysis;
Methods on innovation management 2,5 ECTS	workshops (block seminar)	experiential learning; transdisciplinary learning; creativity learning; collaborative learning;	open-space; future workshops; Design-thinking; disruptive thinking; training on creativity techniques;	facilitating a workshop(part);

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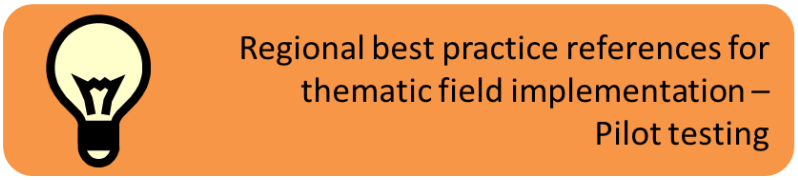
			fun activities; slams and jam sessions; creativity contest; excursions; innovation workshops with regional actors to work out solutions for their challenges;	



Courses:

- Management of Rural Space (Ulčák) /Region Brno/Spring 2016
- Studying Local Rural Systems (Fraňková)/Region Brno/Spring 2016

Literature:

Processes and Management of Innovation:

- Assessment of competence development through case analyzes, HESD:
  Remington-Doucette, S. M., Connell, K. Y. H., Armstrong, C. M., & Musgrove, S. L. (2013). Assessing sustainability education in a transdisciplinary undergraduate course focused on real-world problem solving.

Title of Module	**2.2 Regional Sustainability Challenge 2/2**			
Type	mandatory/compulsive			
Workload	5 ECTS-points			
Contents	Module 2.2 is aiming at the concrete implementation of service-learning project concepts designed and developed in module 1.3. (see above). Students are encouraged to bring their own service learning project to life in the regional context. Based on the learning outcomes of the prior phases of project development and related stakeholder feedback, students will face the opportunities of a transdisciplinary learning environment and will have to tackle “real life problems” of interactions between science and society.			
Course	**Format**	**Main pedagogical approaches**	**Suggested teaching methods**	**Suggested assessment**
Regional Sustainability Challenge 2 5 ECTS	seminar	transdisciplinary learning; service-learning; project-based learning; collaborative learning;	coaching; guided team reflections;	graded project presentation; graded project reflection report; learning diaries, project presentation

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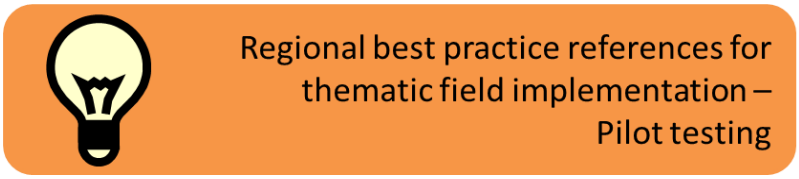

Courses:

- Sustainability Challenge (implementation phase)/Region Vienna Summer Semester 2016/Winter Semester 2016/17
- Service Learning Course, Seep Master Program/Region Vienna

Literature:

Regional Sustainability Challenge 2:

- Generating revenue for social enterprises, HEE:
  Chang, J., Benamraoui, A., & Rieple, A. (2014). Learning-by-doing as an approach to teaching social entrepreneurship.
- Detailed course description, intensive reflection on service-learning, and course materials, HEE:
  McCrea, E. A. (2010). Integrating Service-Learning into an Introduction to Entrepreneurship Course.

Title of Module	**3.1 Pioneers of Sustainability**			
Type	mandatory/compulsive			
Workload	5 ECTS-points			
Contents	**Pioneers of Sustainability** are personalities who proactively approach sustainability challenges. Depending on their environment of activity, intra- and entrepreneurs play an essential role in transformation towards a sustainable development. Within this module intrapreneurs – having pushed change in a business unit or a whole established company – and entrepreneurs – having started their own business – are portrayed. Learning from their success and failure stories, about specific challenges and opportunities of sustainability-driven entrepreneurs is equally exciting and helpful. A sustainability-driven enterprise incorporates sustainability in its business model at all levels. Taking this into consideration, the technical business competencies are conveyed including fundamental aspects of sustainability. The concepts of circular economy and life cycle assessment are just examples of how product and service development is approached in a holistic way. Particular focus on ecological and social aspects is also laid in green logistics and ethical marketing. In this context, a critical view on CSR (corporate social responsibility) differentiates between “greenwashing” and substantial integration of sustainability criteria into the core business. **Impact**-maximization is the common most important factor of sustainability-driven entrepreneurial activities, contrary to the widespread maximization of profit. In addition to operational costs of the business external effects are taken into account and therefore require the evaluation of eco-social costs and benefits. Besides measuring the values, this module also demonstrates strategies on how to deal with them. For example, carbon dioxide emissions should preferably be avoided and only alternatively be compensated. Becoming a sustainable enterprise is a continuous process, making controlling and benchmarking indispensable tools. The impact of the business activities on affected stakeholder groups and the consequences on relations are discussed within thematic block 4 on institutional settings and multi-stakeholder networks.			
Course	**Format**	**Main pedagogical approaches**	**Suggested teaching methods**	**Suggested assessment**

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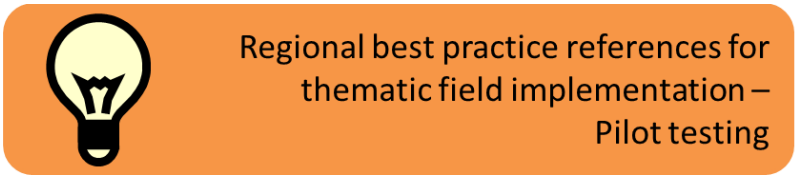
Intra- and Entrepreneurship: Sustainability-driven enterprises and start-ups 2,5 ECTS	lecture /seminar	problem-based learning; intercultural learning (start-up vs. established company); experiential learning	case study analysis of the comparison of established companies and start-ups; role plays; scenarios; guest lectures; excursions	graded case study analysis;
Product and service development 2,5 ECTS	seminar	interdisciplinary learning; transdisciplinary learning; service learning; problem- and project-based learning;	transdisciplinary projects like consulting; working on challenges of own businesses (see module 5.2) or other case studies; guest lectures; excursions;	project report;
Impact 2,5 ECTS	seminar	problem- and project-based learning; transdisciplinary learning; collaborative learning;	case studies on impact of enterprises; case studies on how enterprises measure their impact; guest lectures;	case study analysis; peer assessment of students' case studies



Courses:

- Concepts of social entrepreneurship and social business/Region Vechta/Winter Semester 2016/2017
- Competencies for a sustainable economy, Studium Generale, Unibz

Literature:

Intra- and Entrepreneurship: Sustainability-driven enterprises and start-ups

- Problem-based learning with small scenarios, role plays etc. to engage students in analyzing cases, HEE:
  Tan, S. S., & Ng, C. K. F. (2006). A Problem-Based Learning Approach to Entrepreneurship Education.
- Interdisciplinary, learner-centered and value-based learning to integrate sustainability learning with professional field and other disciplines, HESD:
  Hegarty, K., Thomas, I., Kriewaldt, C., Holdsworth, S., & Bekessy, S. (2011). Insights into the value of a 'stand-alone' course for sustainability education.
- Engaging with small enterprises (via consulting):
  Hynes, B., & Richardson, I. (2007). Entrepreneurship education.

Product and service development:

- Engaging with small enterprises (via consulting):
  Hynes, B., & Richardson, I. (2007). Entrepreneurship education.

Impact:

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- Engaging with small enterprises (via consulting):
  Hynes, B., & Richardson, I. (2007). Entrepreneurship education.

Title of Module	**3.2 Sustainable Organization and Management**			
Type	mandatory/compulsive			
Workload	7,5 ECTS-points			
Contents	**Sustainable Organization and Management** requires a careful choice of legal and organizational forms according to the needs. As participative processes and common ownership are popular elements of integrating specific stakeholder groups, especially employees, the chosen forms ideally reflect these and equip the enterprise with the necessary framework. Complementary to an extensive overview on legal forms including cooperatives and associations, this module opens different perspectives on their aspects. As an example, shareholders of a limited company are not only participating in profits and losses but they are bearing responsibility as co-owners of the company. A sustainable organization is based on sustainable human resources management. The introduction into organizational structures focusses on transparency, participative decision processes and ownership of stakeholders, especially employees. A similar approach applies to management of projects, processes and change in general. The attention to humans and their individual roles is of equal importance as result-orientation. **Finance** is a crucial element in every business model. Therefore learning the basics of accounting, controlling and risk management is the core part of this module. In the context of sustainability-driven enterprises, funding implicates other motivations to invest than making profit. Some investors take eco-social impact into consideration, others are directly related to the company as stakeholders, e.g. customers or suppliers. This generates interest for appropriate fund raising models, such as crowdfunding, hybrid financial models or partnerships. The design and setup of a sustainability-driven start-up will be covered in thematic block 5, where an individual business model and plan are developed.			
Course	**Format**	**Main pedagogical approaches**	**Suggested teaching methods**	**Suggested assessment**
Sustainable Organization and Management 2,5 ECTS	lecture	transdisciplinary learning; collaborative learning;	case study analysis; guest lectures;	graded examination;
Finance 2,5 ECTS	lecture/ seminar	collaborative learning; transdisciplinary; project-based learning;	case study analysis; guest lectures;	financial concept for a project;

Literature:

Finance:

- Generating revenue for social enterprises, HEE:
  Chang, J., Benamraoui, A., & Rieple, A. (2014). Learning-by-doing as an approach to teaching social entrepreneurship.

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Title of Module	4.1 New institutional settings and Multi-stakeholder networks			
Type	mandatory/compulsive			
Workload	7,5 ECTS-points			
Contents	Module 4.1 deals with **new institutional settings** e.g. via involving different stakeholder groups and dealing with questions about how political processes have to be designed in order to support democratization fostering sustainable socio-economic development. The module introduces innovative deliberative structures and participation processes as well as innovative spaces facilitating interactions and relationship building. In broader terms communication processes in society and enterprises are focused and the history and development of institutional settings are of special interest. Partnerships for new markets will be of particular interest as well as knowledge creation processes involving the public sphere. Another focus in module 4.1 are **multi-stakeholder networks** used as practical examples and supporters to push sustainability-driven innovations and business ideas and in particular to build up sustainability networks within and around the university. Examples of such stakeholders and actor constellations are science-society interfaces, cooperation of various sectors or transdisciplinary networks. The module focuses on the working approaches of these networks as well as particular challenges of the settings multi-stakeholder networks are facing. Measures to encounter challenges and barriers are important for this module. Further research on practical examples and involving enterprises as an active part in research processes, could be of great value. The need for translators/facilitators in such processes, in order to respond to different languages, and the possibility that universities could offer such educational/facilitation trainings will be met within the module. Associations and intermediate institutions especially the big, formal associations play an important role in setting standards for such networks in society and economy. The power and the role of these institutions i.e. as multipliers of sustainable socio-economic development is of particular relevance in the module.			
Course	**Format**	**Main pedagogical approaches**	**Suggested teaching methods**	**Suggested assessment**
Transforming institutional settings 2,5 ECTS	lecture	transdisciplinary learning; collaborative learning;	case study analysis with guest speaker; discussions;	
Communication processes in society and enterprises 2,5 ECTS	seminar	experiential learning; transdisciplinary learning; project-based learning; collaborative learning;	visiting conferences; practicing networking; analysis of communication strategies; developing a communication strategy;	graded communication strategy;
Multi-stakeholder networks 2,5 ECTS	seminar	experiential learning; transdisciplinary learning; collaborative learning;	stakeholder analysis; networking; training on moderation/facilitation and mediation skills; building up a network/ facilitating a network event as a group;	facilitating a network event + report

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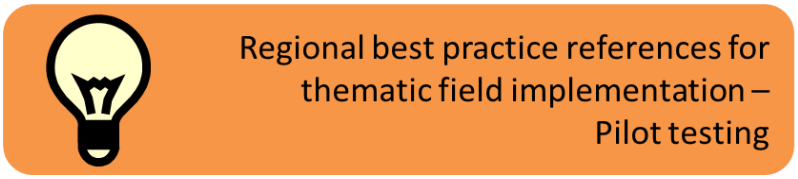

Course:

- Moderation and Participation, Master in Ecosocial design, Unibz

Literature:

Communication processes in society and enterprises

- Analysis of values in the marketing of non-profit organizations, HEE:
  Markley Rountree, M., & Koernig, S. K. (2015). Values-Based Education for Sustainability Marketers. Two Approaches for Enhancing Student Social Consciousness.

Multi-stakeholder networks

- Various problem- and project-based courses in HESD with stakeholder engagement:
  Wiek, A., Xiong, A., Brundiers, K., & van der Leeuw, S. (2014). Integrating problem- and project-based learning into sustainability programs.
- Engeström, Y. (2008). *From Teams to Knots: Activity Theoretical Studies of Collaboration and Learning at Work.*
- Rolloff, J. (2008). Learning from Multi-Stakeholder Networks: Issue-Focused Stakeholder Management.

Title of Module	**4.2 Multi-stakeholder conference**			
Type	mandatory/compulsive			
Workload	5 ECTS-points			
Contents	Module 4.2 will implement the learning from module 4.1 in practice and encourages students to organise a multi-stakeholder conference. This final conference on sustainability-driven entrepreneurship will be a great opportunity for them to meet relevant stakeholders and show them their project results they developed in the course of the master program. The conference is therefore a great platform for networking in between the transnational network of the master program.			
Course	**Format**	**Main pedagogical approaches**	**Suggested teaching methods**	**Suggested assessment**
Multi-stakeholder conference - preparation 2,5 ECTS	seminar	interdisciplinary learning; transdisciplinary learning; collaborative learning; project learning; experiential learning;	organizing a conference; group work; coaching;	portfolio
Multi-stakeholder conference - conference 2,5 ECTS	conference	transdisciplinary learning; interdisciplinary learning; collaborative learning; experiential learning;	facilitating a conference;	graded conference report; graded facilitation of a conference part

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CASE
Competencies for a sustainable socio-economic development

Regional best practice references for thematic field implementation – Pilot testing

Course:

- Sustainability Challenge (closing event)/Region Vienna Winter Semester 2016/17

Title of Module	**5.1 Personal Development and Coaching 3/3**			
Type	mandatory/compulsive			
Workload	7,5 ECTS-points			
Contents	Module 5.1 focuses on the process of vision and mission development via settings oriented on reflection, role models and (peer) coaching. First, students reflect their starting point: Why have they chosen this master program? What knowledge, skills and competences do they already have in relation to sustainability-driven entrepreneurship? Etc. The next step is to integrate new learning experiences from the first semester courses into their personal frame and to apply it in an entrepreneurial context. The learning experiences address transformation and sustainability, and the need for sustainability-driven entrepreneurship in a globally oriented responsible economy. To apply this knowledge in the context of sustainability-driven entrepreneurship and to foster entrepreneurial thinking and creativity, students develop various, rough business ideas. They shall learn to work creatively and to differentiate between business opportunities as such versus personally relevant business opportunities. Bringing all insights from the first semester, the starting motivation and a future perspective together, students shall formulate a personal mission and vision of their future as a sustainability-driven entrepreneur. In module 5.1 students will also begin to build up their own career-relevant network where they can ask for help, support or advice. They look for and get in contact with a personal role model for sustainability-driven entrepreneurship and ask him/her to be his or her mentor during the master program. Students shall also find an academic mentor and will be matched to interdisciplinary tandems for peer support. Consequently every student has at least three contact persons during the master program from different fields of expertise.			
Course	**Format**	**Main pedagogical approaches**	**Suggested teaching methods**	**Suggested assessment**
Personal development and coaching 1 5 ECTS	seminar	transformative learning; reflective learning; normative learning; collaborative learning; experiential learning;	activities for group dynamics; teambuilding exercises; coaching/guided self-reflection; social identity construction; mentoring;	reflective diary; researching the biography of an entrepreneurial role model;
Creativity and opportunity detection 2,5 ECTS	seminar	disruptive/creative learning; experiential learning; problem-based learning; collaborative learning; transdisciplinary learning;	future workshops (with different stakeholders); vision building exercises like Dragon Dreaming; awareness raising activities e.g. from outdoor education; pitching; visiting pitching events;	pitching of an idea;

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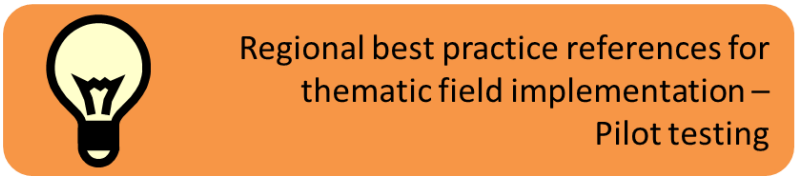

Course:

- Capacity building and entrepreneurship, Bachelor in communication science and culture, Faculty of education, Unibz (http://www.unibz.it/en/public/university/welcome/ViewCoursePdf.customhandler?examId=55391)

Literature:

Personal development and coaching 1

- Interdisciplinary, learner-centered and value-based learning to integrate sustainability learning with professional field and other disciplines, HESD:
  Hegarty, K., Thomas, I., Kriewaldt, C., Holdsworth, S., & Bekessy, S. (2011). Insights into the value of a 'stand-alone' course for sustainability education.
- Mentoring for entrepreneurial identity construction, HEE:
  Rigg, C., & O'Dwyer, B. (2012). Becoming an entrepreneur: researching the role of mentors in identity construction.
- Social identity construction of social entrepreneurs through defining the category and identifying its typical members, HEE:
  Smith, I. H., & Woodworth, W. P. (2012). Developing Social Entrepreneurs and Social Innovators: A Social Identity and Self-Efficacy Approach.

Creativity and Opportunity detection

- Theory on entrepreneurial mindsets and the importance of opportunity-recognition as third- and first-person opportunities:
  Sardeshmukh, S. R., & Smith-Nelson, R. M. (2011). Educating for an Entrepreneurial Career: Developing Opportunity- Recognition Ability.

Title of Module	**5.2 Personal Development and Coaching 2/3**
Type	mandatory/compulsive
Workload	7,5 ECTS-points
Contents	Module 5.2 accompanies semester two in particular module 3.1 which focuses on basics of sustainability-driven entre- and intrapreneurship, the measuring of impacts, module 3.2 organizational management, financing and module 2 emphasizing innovation management. Accordingly, students dive into the real world of businesses when implementing a sustainability-driven service-learning project with a business partner. These experiences might change the expectations, aspirations or the feeling of self-efficacy. Students are offered the opportunity to reflect on those changes and to revision their mission and vision accordingly. Furthermore module 5.2 is the first concrete step towards the creation of an own sustainability-driven enterprise. Following the first semester when students detected and developed various, rough business opportunities from a third-person perspective, now they choose one best idea

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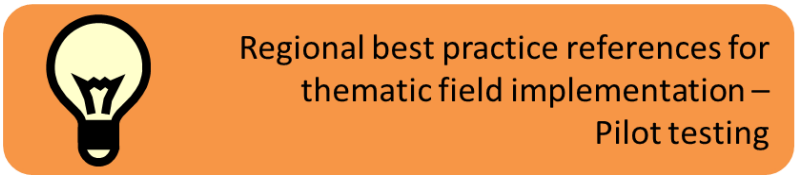
	that fits to their personal motivations and are able to develop it further to have a detailed business idea with a corresponding business model. During the second semester, students are asked to strengthen their mentoring contacts e.g. through regular meetings, some days of job shadowing etc.			
Course	**Format**	**Main pedagogical approaches**	**Suggested teaching methods**	**Suggested assessment**
Personal development and coaching 2 2,5 ECTS	seminar	transformative learning; reflective learning; normative learning; collaborative learning; experiential learning;	activities for group dynamics; teambuilding exercises; coaching/guided reflection; mentoring;	reflective diary;
Sustainable business idea and model 5 ECTS	seminar	Opportunity-centered learning; collaborative learning; project-based learning; experiential learning; problem-based learning;	excursions to and guest speakers from start-up supporting institutions (incubators); business model tools; target group analysis e.g. persona approach; value-proposition; problem-solution fit; revenue model;	graded concept of a business idea;



Course:

Sustainable business idea and model

- Sustainable Development in the Oldenburger Münsterland: solving problems with innovative projects/Region Vechta/Summer Semester 2016

Literature:

Personal development and coaching 2

- Mentoring for entrepreneurial identity construction, HEE:
  Rigg, C., & O'Dwyer, B. (2012). Becoming an entrepreneur: researching the role of mentors in identity construction.

Sustainable business idea and model

- Business idea development through experiential learning (including pitching, guest speakers, mentors and networking events):
  Bliemel, M. J. (2013). Getting Entrepreneurship Education Out of the Classroom and into Students' Heads.
- Opportunity-centered learning for business idea and plan development in disciplinary and culturally heterogeneous groups, HEE:

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Lans, T., Oganisjana, K., Taeks, M., & Popov, V. (2013). Learning for Entrepreneurship in Heterogeneous Groups.

- Synergistic learning with entrepreneurs, HEE:
  Smith, A. J., Collins, L. A., & Hannon, P. D. (2006). Embedding new entrepreneurship programmes in UK higher education institutions: Challenges and considerations.
- Example of a course for bioscience students who develop business plans; the article provides rich background information on the entrepreneurial learning (cycle) following Gibb, 1993:
  Hartshorn, C., & Hannon, P. D. (2005). Paradoxes in entrepreneurship education: chalk and talk or chalk and cheese? A case approach.

Further sources:

- A website providing descriptions and tools for design research methods like the persona method http://www.usewell.be/#/methods/

Title of Module	**5.3 Personal Development and Coaching 3/3**			
Type	mandatory/compulsive			
Workload	7,5 ECTS-points			
Contents	In the third semester module 5.3 resolves a bit from the contents during the semester, but still offers time and space for reflection of the learning experiences and students keep their mentoring network alive. The core activity is the development of a business plan based on the business model developed in semester two. Module 5.3 ends with a week of fear and failure. This is intended as a last step to prepare students mentally for starting their own business. During the week they meet entrepreneurs and learn from their personal reflections and stories of fears and failures but also what motivated them to start again. The overall aim of the week is that failure is perceived as an integral part of the learning process of an entrepreneur. The storytelling is accompanied by inputs on legal, insurance and financial aspects of failure and experiential activities in which students can test their attitude towards risk, experience failure and learn to deal with it.			
Course	**Format**	**Main pedagogical approaches**	**Suggested teaching methods**	**Suggested assessment**
Personal development and coaching 3/ A week of fear and failure 2,5 ECTS	seminar	transformative learning; experiential learning; outdoor learning; reflective learning; normative learning; collaborative learning;	activities for group dynamics; teambuilding exercises; coaching/guided self-reflection; mentoring; story-telling with entrepreneurs about their failures; simulation game/role play to experience effects of (losing) money; outdoor education or from martial arts to experience failure like the “Helium Stick” exercise;	reflective diary;
Sustainable business plan 5 ECTS	seminar	mentoring; coaching; Opportunity-centered learning;	market study; financial planning; time schedule and	graded sustainable business plan;

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		collaborative learning; experiential learning; project-based learning;	milestone plan; mentoring; coaching;	

Literature:

Personal development and coaching 3 – A week of fear and failure

- A program strengthening the students' entrepreneurial identity by developing his/her understanding for why he/she engages and persists in taking entrepreneurial action via coaching and venture-creation, HEE:
  Williams Middleton, K., & Donnellon, A. (2014). Personalizing Entrepreneurial Learning: A Pedagogy for Facilitating the Know Why.
- Mentoring for entrepreneurial identity construction, HEE:
  Rigg, C., & O'Dwyer, B. (2012). Becoming an entrepreneur: researching the role of mentors in identity construction.

Sustainable business plan

- Problem-based learning with small scenarios, role plays etc. to engage students in thorough analyzes of their business plans, HEE:
  Tan, S. S., & Ng, C. K. F. (2006). A Problem-Based Learning Approach to Entrepreneurship Education.
- A comparison of learning outcomes between social business plan development versus case study analysis concerning social and civic awareness and participation, HEE:
  Kwong, C. C. Y., Thompson, P., & Cheung, C. W. M. (2012). The Effectiveness of Social Business Plan Competitions in Developing Social and Civic Awareness and Participation.
- Opportunity-centered learning for business idea and plan development in disciplinary and culturally heterogeneous groups, HEE:
  Lans, T., Oganisjana, K., Taeks, M., & Popov, V. (2013). Learning for Entrepreneurship in Heterogeneous Groups.
- Example of a course for bioscience students who develop business plans; the article provides rich background information on the entrepreneurial learning (cycle) following Gibb (1993), HEE:
  Hartshorn, C., & Hannon, P. D. (2005). Paradoxes in entrepreneurship education: chalk and talk or chalk and cheese? A case approach.

Title of Module	**5.4 Thesis**
Type	mandatory/compulsive
Workload	17,5 ECTS-points
Contents	In the last semester, in module 5.4 students will conduct activities to write their master thesis. It is recommended to the students either to prototype or create their own sustainability-driven venture/start-up or to implement a sustainability-driven project in an existing enterprise, NPO or network. They shall monitor the process and evaluate the outcomes in terms of an impact assessment. A (research) colloquium functions as a base where students and teachers meet regularly for exchange on the progress of the thesis projects, and where research methods and tools can be repeated according to the students' needs.

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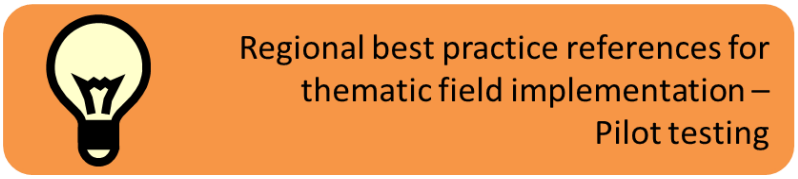
Course	Format	Main pedagogical approaches	Suggested teaching methods	Suggested assessment
Master Thesis on Sustainability-driven Entrepreneurship 15 ECTS	thesis work	action learning; inquiry-based learning; problem-based learning; Mentoring;	mentoring; prototyping; venture creation;	graded thesis;
Accompanying research colloquium 2,5 ECTS	colloquium	collaborative learning; interdisciplinary learning;	student presentation; coaching; discussion; feedback; science slam;	thesis presentation;

Literature:

Master Thesis on Sustainability-driven Entrepreneurship with accompanying research colloquium

- Students start new business ventures with monthly sessions to share learning and problem-solving and peer feedback, HEE:
  Rae, D. (2009). Connecting Entrepreneurial and Action Learning in Student-Initiated New Business Ventures: The Case of SPEED.
- Tutored group-enquiry to work on sustainable solutions for a local community's problems, HESD:
  Ellis, G., & Weekes, T. (2008). Making Sustainability 'Real': Using Group-Enquiry to Promote Education for Sustainable Development.

Title of Module	6.1 Elective Courses			
Type	elective			
Workload	7,5 ECTS-points			
Contents	Module 6.1 provides the opportunity for picking a specialization area. Students choose courses particular interesting for their solution concepts which is recommended to be combined with the topic of the thesis. Elective courses are recommended to focus on regional opportunities and/or challenges outlined in the table.			
Course	**Format**	**Main pedagogical approaches**	**Suggested teaching methods**	**Suggested assessment**
1-3 courses	any kind	any kind		



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Courses:

- Profiling internship - Inclusion/Region Vechta/Summer Semester 2016
- Project design, Master in Ecosocial Design, Unibz

Literature:

- Example of three creative assignments to introduce sustainability in specific disciplines (a case study task, an innovation task and a communication challenge) adaptable for lectures, project-work and workshops, HESD:
  Glassey, J., & Haile, S. (2012). Sustainability in chemical engineering curriculum.

Title of Module	**6.2 Regional Hot Spots and thematic challenges**			
Type	mandatory/compulsive			
Workload	7,5 ECTS-points			
Contents	Module 6.2 focuses on regional hot spots and thematic challenges connected to innovation processes. Students should emphasize their studies on not more than two regional fields (e.g. energy, agriculture etc.) and develop solutions for challenges of regional actors. Exchange with different universities via a virtual seminar helps students to embed their experiences within a transnational network and learn from each other via reflecting about various challenges and potentials.			
Course	**Format**	**Main pedagogical approaches**	**Suggested teaching methods**	**Suggested assessment**
1-3 courses	seminar	problem-based learning; inquiry-based learning; interdisciplinary learning; transdisciplinary learning; collaborative learning;		

Literature:

- Critical reflection on the benefits and challenges of interdisciplinary learning (including team-teaching), HESD:
  Feng, L. (2012). Teacher and student responses to interdisciplinary aspects of sustainability education: what do we really know?
- Interdisciplinary, learner-centered and value-based learning to integrate sustainability learning with professional field and other disciplines, HESD:
  Hegarty, K., Thomas, I., Kriewaldt, C., Holdsworth, S., & Bekessy, S. (2011). Insights into the value of a 'stand-alone' course for sustainability education.
- Virtual learning:
  Barth, M., & Burandt, S. (2013). Adding the 'e-' to Learning for Sustainable Development: Challenges and Innovation.

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Title of Module	6.3 Internship			
Type	mandatory/compulsive			
Workload	7,5 ECTS-points			
Contents	Module 6.3 provides the opportunity to learn from an internship which is recommended to be combined with the topic of the thesis. Students will work in a field of interest together with business partners and sustainability-driven entrepreneurs.			
Course	**Format**	**Main pedagogical approaches**	**Suggested teaching methods**	**Suggested assessment**
Internship with accompanying tutorial	Internship+ tutorial	experiential learning; problem-based learning; transdisciplinary learning; social learning;	one internship of at least 3 month; several small internships as job shadowing; mentoring; coaching; reflective assignments;	learning journal; report;

4.3 Conclusion – how to continue

The next step for developing the CASE master program further is to pilot some of the courses or whole modules as proposed above. The different regions of the CASE project will test and evaluate courses that address the outlined contents and use the recommended methods. Of special interest are pilots that have a transdisciplinary orientation and foster university-business cooperation.

Pilots should also be used to develop and to test new courses. Certain gaps can be identified in the module and course descriptions where we could neither match existing courses nor find reports of relevant experiences in the literature. Here more research about good practice (perhaps in other academic fields) is needed to develop new contents and methods. This is particularly important for

- the first week challenge,
- the week of fear and failure,
- the courses on new institutional settings and multi-stakeholder networks, and
- the coaching and mentoring approaches in block five.

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5. Outlook: Development of a training for CASE teachers

Another important step within the CASE project is to conceptualize and test a capacity building course for teachers, which enables them to teach courses in the master program. In order to facilitate competence development of students, teachers have to change the role from being an expert who presents his/her knowledge to students in a structured way to being a facilitator of learning processes. Furthermore, teachers need special competencies for implementing ESD (cf. UNECE, 2012) and EE in higher education as they themselves need sustainability or entrepreneurial competencies but also knowledge about HESD and HEE teaching and learning approaches and corresponding pedagogical competencies for facilitating these approaches. It is repeatedly stated that capacity building for teachers is needed in order to enable them to create learning settings in which students can improve their competencies (cf. Barth & Rieckmann, 2012; European Commission & Enterprise and Industry Directorate-General, 2014; UE4SD, 2015, p. 4).

As basic prerequisites for teachers in the CASE master program, we define

- (either) basic knowledge in sustainability (sciences)
- (or) basic knowledge in entrepreneurship education (business models and plans)
- basic knowledge and experience concerning competence-oriented teaching and learning.

Additionally the teacher training should

- convey the core idea of the master program of fostering sustainability-driven entrepreneurship through a real-world, competence-oriented learning approach,
- deepen the teachers competencies for competence-oriented teaching with a focus of the master core methods,
- and allow for exchange about regional experiences and strategies how a transdisciplinary orientation in teaching as well as university-business cooperation in general can be fostered.

Following we outline which contents should be dealt with and which competencies should be developed within the teacher trainings.

Topics in the training concerning the core idea of the CASE master program

- The master mission: fostering a socio-ecological transformation
- The concept of sustainability-driven entrepreneurship as a driver for change
- Science-society interfaces: responsibility and embeddedness of universities in a (global) social system
- Competence development for solving real-world problems through innovation and critical thinking
- Structure and modules of the master program
    - The contents
    - The pedagogical framework

Topics in the training concerning competence-oriented teaching with a focus of the master core methods

The literature review on methods in the field of HESD and HEE has given several hints what teachers experience as the core challenges when adopting a less traditional and more competence-oriented teaching format or when cooperation formats heighten the organizational complexity of a course for the teacher. These are:

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- adopting the role of a facilitator and learner, not an expert
- but still having disciplinary knowledge that is state of the art
- being able to handle group dynamics
- being able to stimulate reflective learning
- having a high tolerance for ambiguity to allow students to pursue their own plans
- not being biased by own beliefs and values, but open for new learning
- identify affective learning outcomes
- awareness of being a role model
- operating as a team member (in team-teaching)
- time resources (e.g. for making connection to partners)
- being well organized to manage transdisciplinary project courses.

These challenges should be addressed within the following topics of the teacher training:

- Competence orientation as basic attitude towards teaching and learning: knowledge/competences as the result of social construction through active, self-directed and collaborative learning / and experiential learning
- Reflection and exchange on the role of a teacher
- How to stimulate critical reflection
- The master core methods: service-learning and business-plan development
- Tools to accompany group work with professional project management
- Introduction to systemic coaching as a means to support the project development of groups and individuals
- Ways and tools for formative assessments

Topics in the training concerning exchange about regional experiences and strategies how a transdisciplinary orientation in teaching as well as university-business cooperation in general can be fostered

- Science-society interfaces
  - Exchange about benefits of science-society interfaces, especially university-business cooperation
  - The concept of transdisciplinarity
  - Exchange about regionally existing structures for science-society interfaces
  - Exchange about strategies for establishing and managing (university-business) cooperation for transdisciplinary courses
- Teaching in cooperation formats
  - Exchange about teaching experiences at the science-society interface, especially of university-business cooperation
  - Transdisciplinary learning and service learning
  - Tools that support transdisciplinary teaching formats

The training will be developed as a blended two-day workshop with a mentored virtual self-study phase.

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Sources and good practices for teacher trainings in HESD and HEE

Using activating methods in higher education
A general capacity building course having been offered for teachers at Vechta University.

SHIFT – From learning to teaching
A capacity building course having been offered for teachers at Vechta University.

Leading Practice Publication. Professional development of university educators on Education for sustainable Development in European countries.
The UNESCO recently published a comprehensive document that addresses capacity building of teachers in HESD (UE4SD, 2015). Several good practices around Europe are depicted in small and large case studies. Source: http://en.unesco.org/esd-repo/660/1/UE4SD-Leading-Practice-PublicationBG.pdf

Educating Entrepreneurship Educators. Delegate Manual.
The international network coneeect offers interactive training courses for academic entrepreneurship teachers to improve the Entrepreneurship Education across Europe. From 2013 to 2015 five intensive training weeks were offered throughout Europe. The trainings contained keynotes on EE, a range of teaching techniques and pedagogies, sessions to test new teaching methods and learning in practice. The experiences are documented in a manual (coneeect, 2015). The Coneeect homepage offers short videos on EE. The manual can be downloaded here: http://www.coneeect.eu/Docs/Delegates_Manual_Final.pdf

Global Online Course. Environmental Education: Trans-disciplinary Approaches to Addressing Wicked Problems.
In spring 2015 an international online course on transdisciplinary learning in HESD was run for teachers and students. All materials will be further available as an online archive. The material includes short lectures (approx. 10-minute videos) and questions for discussion on transdisciplinary approaches, environmental education and related pedagogies, different teaching and learning approaches (e.g. experiential and transformative learning) and basics in environmental psychology, sociology, sustainability sciences etc. Homepage: http://www.globalee.net/

Entrepreneurship education: a guide for educators.
The European Commission published a guide to showcase examples of good practices in training and supporting teachers in entrepreneurial education. The examples were collected in teacher and expert workshops at European level (European Commission & Enterprise and Industry Directorate-General, 2014).

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