# Final Report

INnovative educaTion foR sustaInable eNtrepreneurShip In Life sCiences

Erasmus+ Strategic Partnership

01-09-2018 - 31-12-2021

# O5 - INTRINSIC Case studies, testimonials & application recommendation/good practice

Leading: UH, supported by BOKU & partners

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# Content



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## 1. Introduction

The concept of entrepreneurship does not necessarily anymore relate only to the situation where someone establishes an organization and faces the risks associated with this action (Dees, 1998; O'Brien and Hamburg, 2019). Nowadays, it is more understood as a way of thinking and behaving. This composite of motives, behavioral tendencies, competences and thought processes, also called “mindset”, has wide implications to the society (O'Brien and Hamburg, 2019).

Indeed, entrepreneurship has been addressed as a key transversal skill in various EU documents. For example, the EU Commission’s EntreComp framework highlights entrepreneurship as being relevant for all aspects of society, and not just businesses (Bacigalupo et al., 2016). The concept has evolved throughout years, and now it is understood more as a competence than a skill (O'Brien and Hamburg, 2019). Entrepreneurial competences allow individuals to adapt to change, while at the same being aware of their actions from the social responsibility-perspective.

To really take sustainability into consideration for entrepreneurship in a wider sense in society, the whole ecosystem needs to be considered. An entrepreneurial ecosystem consists of a set of interdependent actors, for example entrepreneurs, suppliers, government, buyer etc., as well as the system-level institutional, socioeconomic and informational contexts (Audretsch and Belitski, 2017).

INTRINSIC builds upon the understanding of sustainable entrepreneurship by Pacheco et al. (2010), later presented by Wagner et al. (2021), based on the United Nations General Assembly (2015) and Schaltegger et al. (2018): *“the discovery, creation, evaluation, exploitation of opportunities to create innovative goods and services that are consistent with regional, national and sustainable goals”* Wagner et al. (2021).

This report has four main goals:

i. To select, review and integrate literature relevant for the INTRINSIC approach
ii. Report previous studies and projects conducted around the topic
iii. Present case studies from Intrinsic project
iv. conclude the best practices for conducting sustainable entrepreneurship education

## 2. The INTRINSIC Erasmus+ Project

INTRINSIC - INnovative educaTion foR sustaInable eNtrepreneurShip In Life sCiences is an EU funded Erasmus+ strategic partnership project, which focuses on enabling higher education teachers at Life Science universities to design curricular interventions, pedagogical methods and assessment criteria for fostering a sustainable entrepreneurial mindset in their students. The focus and the core of the whole project was to develop innovative resources, including an interactive ePlatform and mobile applications. With the ePlatform, teachers are provided access, training and guidance to implement sustainable entrepreneurship education in their courses. New evaluation methods, like the Mindset Monitor make it possible to monitor

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students' entrepreneurial-related activities and associated changes in the mindset, as it has been shown by a thesis study supported by INTRINSIC (van Saltbommel, 2021).

INTRINSIC's overarching goal was to support higher education teachers at Life Science Universities in Europe (ICA) to systematically enrich their existing courses with innovative teaching activities to foster sustainable entrepreneurship competences in their students. Sustainable entrepreneurship can be defined as entrepreneurial activity aiming at solving problems related to sustainability by the discovery, creation, and exploitation of opportunities that contribute to the SDGs by generating social, environmental, and economic value for others in society. A composite of transversal skills (interpersonal competence, diversity and interdisciplinary competence, systems thinking competence, strategic action competence, normative competence and foresighted thinking competence) has been identified as being central for sustainable entrepreneurship (Ploum et al., 2018b) and considered as fundamental for tertiary education graduates from Life Science Universities to successfully engage in addressing the global challenges of the 21st Century and contribute to the achievement of the SDGs. Sustainable entrepreneurship by this becomes a major driver of economic, ecological and social sustainability (Taragola et al., 2010; Sołoducho-Pelc, 2020).

However, in the perception of many higher education teachers at Life Science Universities entrepreneurship education is still often being seen as supporting a neoliberal philosophy of unsustainable growth with an egoistic individuum acting on personal enrichment following a narrow focus on economic value creation - the 'business logic'. But increasingly, especially powered by sustainability and the focus on value creation for others – hence taking a more "humanistic" perspective - entrepreneurship in its broader sense is moving away from the neoliberal paradigm (Bell, 2021). Especially Life Science Universities dedicated to the sustainable use of natural resources have a great responsibility to contribute to the sustainable transformation in this regard.

That is why a broader concept like sustainable entrepreneurship education focuses on the development of entrepreneurial attitudes and skills as well as personal qualities which are not only focused on the creation of new ventures, but on the development of an entrepreneurial mindset (Fayolle and Gailly, 2008) that builds upon sustainability as a normative value (Ploum et al., 2019). At at the same time this mindset enables students to take initiative and steer ones' own learning, development, and career under the high level of uncertainty and complexity in today's society (Baggen et al., 2021), being therefore of relevance in different other working life contexts later in their careers (Lans et al., 2018). That is why the mindset and the associated skills have been also called (non-cognitive skills) "life skills" (Krueger, 2015). Also the European Union's Entrepreneurship Competence Framework (EntreComp) defines entrepreneurship as a transversal competence that hinges on the creation of cultural, social or economic value applying to all spheres of life (Bacigalupo et al., 2016; EntreComp Europe, 2020).

That is why the primary focus of INTRINSIC is on supporting the evolution of students' attitudes and "mindset" (Fayolle et al., 2006), as a "constellation of motives, skills, and

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thought processes" (Davis et al., 2016) and in more detail a "cognitive perspective that enables an individual to create value by recognizing and acting on opportunities, making decisions with limited information, and remaining adaptable and resilient in conditions that are often uncertain and complex" (Daspit et al., 2021). As the entrepreneurial mindset develops over time, individuals need to be regularly and systematically exposed to stimuli and encounter new experiences in this regard (Daspit et al., 2021). Life Science Universities here are in a unique position to be able to integrate activities to support the development of an entrepreneurial mindset related to sustainability systematically into different courses dealing with topics highly relevant for sustainability over several semesters or years (Daspit et al., 2021). The success of INTRINSIC is therefore depending on the coordinated implementation of its innovative sustainable entrepreneurship education tools, methodologies, pedagogies, and trainer-the-trainer materials at Life Science Universities. Educators play a central role in the delivery of these contents and competences, taking the role of a facilitator providing a safe environment allowing to gain significant learning experiences along the development of the entrepreneurial mindset where students can discover their own potential (Mueller, 2011).

# 3. Definition of Sustainable Entrepreneurship

## 3.1 Different Definitions related to Sustainable Entrepreneurship from Literature

This chapter will present some of the terms and their definitions associated to sustainable entrepreneurship. Finally, the definition used by INTRINSIC is presented.

> *"Sustainable entrepreneurship is the scholarly examination of how opportunities to bring into existence future goods and services are recognized, developed, and exploited by whom, and with what economic, social and ecological gains" (Binder and Belz, 2015).*
>
> *"Sustainable entrepreneurship refers to the discovery, creation, and exploitation of entrepreneurial opportunities that contribute to sustainability by generating social and environmental gains for others in society (Hockerts and Wüstenhagen, 2010; Pacheco et al., 2010; Shepherd and Patzelt, 2011)" (Greco and de Jong, 2017).*
>
> *"Based on this idea, sustainable entrepreneurship is defined as "the examination of how opportunities will bring into existence future goods and services as discovered, created, and exploited, by whom, and with what economic, psychological, social, and environmental consequences" (Cohen and Winn, 2007)" (Sarango-Lalangui et al., 2018).*
>
> *"Speaking about sustainable entrepreneurship there is no universal consensus on the precise meaning of the construct itself, as sustainable or sustainability, within the grasps of entrepreneurship, means a mixture of complicated things to many people (Shepherd and Patzelt, 2011; Majid and Koe, 2012). For instance, Tilley and Young (2009)describe sustainable entrepreneurship as being future orientated making contributions to economic prosperity, social justice and environmental protection. Similar previous researchers have tried to use the triple bottom line construct, but it was too difficult for them to come up with valid and aggregate study results, as the majority of them were focusing more on environmental issues" (Tarnanidis and Papathanasiou, 2015).*

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*"Sustainopreneurship (entrepreneurship and innovation for sustainability) is a concept that has emerged from the earlier concepts social entrepreneurship and ecopreneurship, via sustainability entrepreneurship. The concept means to use creative business organizing to solve problems related to sustainability to create social and environmental sustainability as a strategic objective and purpose, at the same time respecting the boundaries set in order to maintain the life support systems in the process. In other words, it is a "business with a cause" – where the world problems are turned into business opportunities by deployment of sustainability innovations" (*Wikipedia, https://en.wikipedia.org/wiki/Sustainopreneurship).

*"Sustainability entrepreneurship (SE) takes a slightly different perspective from the traditional focus of entrepreneurship by emphasizing additional goals of promoting sustainable living and environmental improvement. An emphasis on sustainability within entrepreneurship involves searching for opportunities for new products or services or new technologies or production processes that alleviate social or environmental conditions, make more efficient use of energy and natural resources, and harness new resources that are more abundant, cheaper to produce, and less harmful to society" (Basu et al., 2008).*

*"Ecopreneurship is a term coined to represent the process of principles of entrepreneurship being applied to create businesses that solve environmental problems or operate sustainably. The term began to be widely used in the 1990s, and it is otherwise referred to as "environmental entrepreneurship." In the book Merging Economic and Environmental Concerns Through Ecopreneurship, written by Gwyn Schuyler in 1998, ecopreneurs are defined as follows:*

*Ecopreneurs are entrepreneurs whose business efforts are not only driven by profit, but also by a concern for the environment. Ecopreneurship, also known as environmental entrepreneurship and eco-capitalism, is becoming more widespread as a new market-based approach to identifying opportunities for improving environmental quality and capitalizing upon them in the private sector for profit.*

*Although ecopreneurship initiatives can span a wide range of issues from ocean pollution to recycling to food waste, they tend to follow reoccurring environmental principles such as systems thinking, cradle to cradle product design, triple bottom line accounting, etc..*

*Systems thinking is a core element of ecopreneurship. As it pertains to business is best illustrated in the book Entrepreneurship and Sustainability by Andrea Larsen: "Systems thinking applied to new ventures reminds us that companies operate in complex sets of interlocking living and non-living, including markets and supply chains as well as non-living systems.... Taking a systems perspective reminds us that we are accustomed to thinking of business in terms of discrete units with clear boundaries between them. We forget that these boundaries exist primarily in our minds or as legal constructs." (Dixon and Clifford, 2007)*

*"Sustainable Entrepreneurial action: Whereas conventional entrepreneurship is more associated with counteracting sustainable development, as almost everything is subordinate to the bottom line, sustainable entrepreneurial action is seen as a promising way to preserve ecosystems, counteract climate change, reduce environmental degradation, improve agricultural practices, and maintain biodiversity (Cohen & Winn, 2007; Dean & McMullen, 2007; Patzelt & Shepherd, 2011). The central idea behind the development of sustainable ventures is that the activities performed by entrepreneurs in the pursuit of gains must not undermine the ecological and social environments in*

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*which they operate; and when necessary, they must restore or nurture such environments towards recovering the balance between the environment, society and economic activity (Parrish, 2010; Patzelt & Shepherd, 2010; Schaltegger & Wagner, 2011). This and other definitions of sustainable entrepreneurship (e.g. Dean & McMullen, 2007; Hockerts & Wüstenhagen, 2010; Pacheco et al., 2010) resonate with mainstream sustainability ideas. Ultimately, its overarching aim is to balance the competing demands for environmental protection and economic development, emphasizing economic, ecological and social goals in equal degrees (Patzelt & Shepherd, 2010)." (Ploum, 2018)*

*Values related to sustainable entrepreneurship: "Pro-environmental behavior values and moral competencies are important elements in the very early stage of recognizing opportunities for sustainable development."*

*Validated framework of 6 competencies for sustainable entrepreneurship: diversity competence, foresighted thinking competence, systems thinking competence, interpersonal competence, normative competence, strategic action competence*

*The overarching aim of Sustainable Entrepreneurship is ultimately to balance the competing demands for environmental protection and economic development, emphasizing economic, ecological, and social goals in equal degrees.*

*Sustainable entrepreneurs are described as those individuals who holistically integrate the goals of economic, social, and environmental entrepreneurship into an organization that is sustainable in its goal and sustainable in its form of wealth generation." (Ploum et al., 2018a; 2019).*

Overall, it could be recognized, that there has been a shift from a narrow definition of entrepreneurship as simply founding a business, to a much broader understanding of a value creation perspective (Lackéus, 2015; Moberg et al., 2015; Bacigalupo et al., 2016). That is why, Moberg et al. (2015) defined entrepreneurship as: *"acting upon opportunities and ideas and transform them into value for others, while the value that is created can be financial, cultural, or social."* In view of the contribution of entrepreneurship we would add the environmental perspective.

Moberg et al. (2015), based on their value creation-oriented definition of entrepreneurship, therefore also provided a broad and inclusive definition of entrepreneurship education, describing it as *"content, methods and activities that support the development of motivation, skill and experience, which make it possible to be entrepreneurial, to manage and participate in value-creating processes."*

## 3.2 INTRINSIC Working Definition of "Sustainable Entrepreneurship"

Based on a thorough analysis of the definitions of (sustainable) entrepreneurship in literature, INTRINSIC developed the following working definition of sustainable entrepreneurship comprising two levels, as basic and a more expressed one:

1. Sustainable entrepreneurship in its basic form is entrepreneurial activity considering economic, psychological, social, and environmental consequences and by this is not undermining the ecological and social environments in which they operate.
2. Sustainable entrepreneurship in its more expressed form is aiming at solving problems related to sustainability and to create social and environmental sustainability as a

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strategic objective and purpose by the discovery, creation, and exploitation of entrepreneurial opportunities that contribute to sustainability by generating social (also described by SDGs, like No poverty, Zero hunger, Good health and well-being, Quality education, Gender equality, Reduced inequalities etc.) and environmental (e.g. preserve ecosystems, counteract climate change, reduce environmental degradation, improve agricultural practices, and maintain biodiversity captured e.g. by the SGDs Climate action, Life below water, Life on Land, Responsible consumption and production) gains for others in society.

## 4. The Sustainable Entrepreneurship Competences

INTRINSIC builds on six empirically derived competences for sustainable entrepreneurship described by Ploum et al. (2018b). Lans et al. (2021) later presented these competences arranged in "The Sustainable Entrepreneurship Competence Pyramid" (Fig. 1), from the better known at the bottom to the less known at the top. These competences are anticipated to be used dynamically by a sustainable entrepreneur during acting. The pyramid itself emerged as a result of the discussions within INTRINSIC.


*Figure 1: The Sustainable Entrepreneurship Competence Pyramid (Lans et al., 2021).*

Most of the competences described by Ploum et al. (2018b) overlap with key competences described by other authors as relevant for sustainable development (Bianchi, 2020; Brundiers et al., 2021) and are also referenced by other authors (Diepolder et al., 2021).

Values thinking as normative competence has been described as a central competence "guiding" the application of all other competences for sustainability (Bianchi, 2020) but also for sustainable entrepreneurship (Ploum et al., 2019). Raising awareness about the existing problems and stimulating the development of normative reasoning in students should be

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therefore a core element of sustainable entrepreneurship teaching at Life Science universities (Thelken and de Jong, 2020).

Systems thinking is also considered as being a core competence for sustainable development (Bianchi, 2020) and also for entrepreneurial activities in general (Kriedel, 2017). However, as it became evident in discussions with sustainable entrepreneurs, this set of skills is not always applied at the same time – some skills might be of relevance at the beginning of an entrepreneurial journey (like foresighted thinking and normative competence), while other competences may become relevant in later stages (interpersonal competence, systems thinking competence, interdisciplinary competence).

A main difference between the two approaches – the use of the competences for sustainable development or for sustainable entrepreneurship - lies in the entrepreneurial intention and mindset when applying them as a sustainable entrepreneur, which has a stronger action component towards innovation and new value creation, that is also reflected in the associated teaching activities focusing on opportunity identification, opportunity evaluation, opportunity exploration (i.e., getting into action) and creation of new value for others (Baggen et al., 2021).

It has also been recognized that the regulation of the use of the different competences requires strong intrapersonal competences and an associated mindset that is able to manage the often complex and uncertain situations (Brundiers et al., 2021). This experience also has been termed ”the roller-coaster ride...where the entrepreneurial process is described as “trying to control a roller coaster while riding it” (Lackéus, 2014) (Fig. 2). A specific mindset as a “constellation of motives, skills, and thought processes” (Davis et al., 2016) and a “cognitive perspective enabling entrepreneurs to create value by recognizing and acting on opportunities, making decisions with limited information, and remaining adaptable and resilient in conditions that are often uncertain and complex” is needed (Daspit et al., 2021).

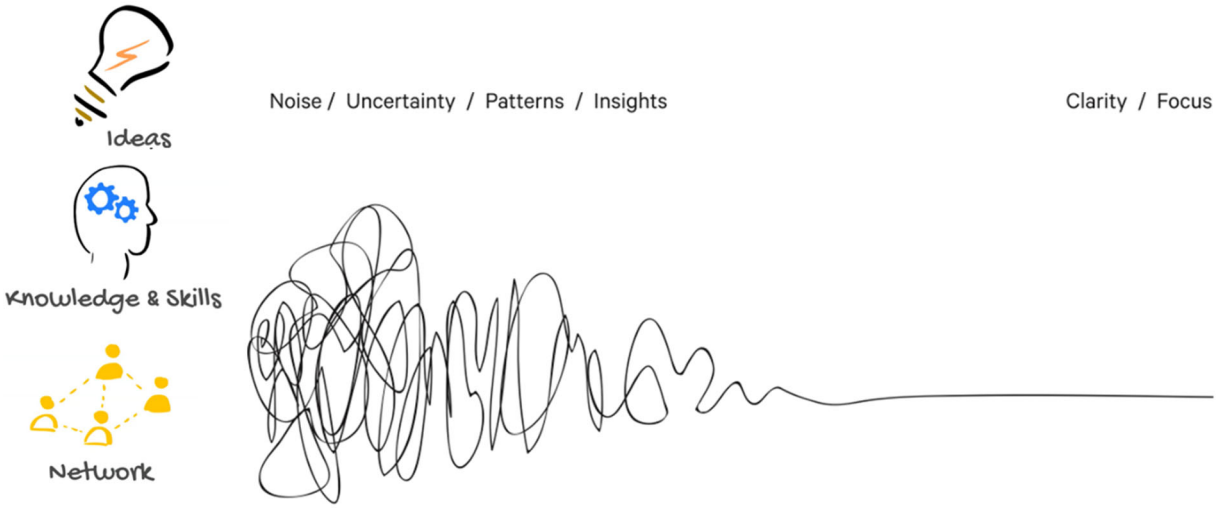


*Figure 2: The entrepreneurial process – from one’s own resources according to the effectuation model, to uncertainty to insight and focus (Image source: Process of Design Squiggle by Damien Newman, http://thedesignsquiggle.com, CC BY-ND).*

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Self-regulation as “the regulation of the self by the self, bringing thinking, feelings and behavior into accord with some consciously desired goal” (O’Shea et al., 2017) has been identified as an important element to deal with such situations in general (Kuhl et al., 2006) and also related to entrepreneurship. Self-efficacy as ”the belief in one’s ability to plan and to execute the skills necessary to produce a certain behavior” (Bandura, 1997) is believed to be a central component helping entrepreneurs to stay confident in these kind of situations and of entrepreneurial intentions per se (Pihie and Bagheri, 2013). Self-efficacy belief also was the best predictor for academic success in higher education in general (Schneider and Mustafić, 2015). However, only recently it has been suggested, that the goal of training and coaching interventions should also be to find a balance between confidence and discrepancy perception rather than maximizing self-efficacy (Gielnik et al., 2020).

Closely related to this feeling of being in control of the situation, is the effectuation approach (Sarasvathy, 2011), an independent, risk-minimizing logic of entrepreneurial action and decision-making, which makes it possible to actively shape the future together with others based on one's own skills and interests, even if the situation is uncertain and a prediction or planning is difficult (https://www.effectuation.org).

In the following, as a starting point, the six competences described by Ploum et al. (2018) are presented with their respective learning goals *(“At the end of the study program, my students are able to…”*) (Lans et al., 2021):

**Interpersonal Competence**

- Identify their own strengths and weakness and look for complementarities in their idea/project
- Manage/facilitate constructive conflict around their sustainability idea/project
- Involve ‘others’ in their idea (entrepreneurial team, stakeholders)
- Motivate, communicate, and lead others, especially around sustainability

**Strategic Action Competence**

- Understand that there is a window of opportunity/timing of their idea/project
- Identify the key steps to take to develop their idea/project
- Identify and include stakeholders/partners in the development of their idea/project
- Reflect on the sustainability of their actions (responsibility, reflection-in-action) and act accordingly
- Critically evaluate their actions in the light of the realization of their idea/project

**Diversity/interdisciplinarity competence**

- Understand that there are different viewpoints/perspectives related to their idea/project (e.g., users, stakeholders, social perception, multi-disciplinary perspective)
- Apply an interdisciplinary lens to their idea/project and include different stakeholders
- Evaluate their ideas/projects in the perspective of these different viewpoints
- Operate with respect to other viewpoints in the context of your idea/project

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**Systems thinking competence**

- Understand that they and their idea(s) are part of a broader system
- Understand their own position and the position of their idea(s) in this system
- Identify system elements (e.g., causal relations, feedback loops)
- Analyse broader systems, including boundaries (zooming out)
- Analyse strengths and weaknesses and propose improvements to reduce the negative effects on the environment for the future

**Normative Competence**

- Understand values/norms in the context of sustainability projects/challenges
- Explain the decisions made in relation to sustainability in projects
- Evaluate and challenge their own values
- Implement these values in their decisions and actions with others

**Foresighted thinking competence**

- Identify entrepreneurial risks and opportunities in future developments
- Sketch and evaluate pictures/scenarios of (possible) future(s)
- Understand the local/global and short/long term implications of these scenarios for action
- Connect (own) entrepreneurial ideas to a broader social/environmental/economic context

## 5. The Sustainable Entrepreneurial Mindset

The development of a sustainable entrepreneurial mindset in Life Science students represents the main traget of INTRINSIC. That is why as an important basis, based on selected theoretical models (Ardichvili et al., 2003; Fayolle et al., 2006; Fishbein and Ajzen, 2010) and empirically validated elements (Ploum et al., 2018a; 2019; Jiatong et al., 2021; Tehseen and Haider, 2021), the INTRINSIC Sustainable Entrepreneurship Model was developed (Fig. 3).

Fig. 4 shows the elements that the are considered to be assocuated to the mindset, and Fig. 5 shows the elements, that can be addressed by teaching and learning activities.

Aspects of the personality often considered as enduring characteristics of a person that have been associated with entrepreneurhsip (Obschonka and Stuetzer, 2017) are not addressed by INTRINSIC.

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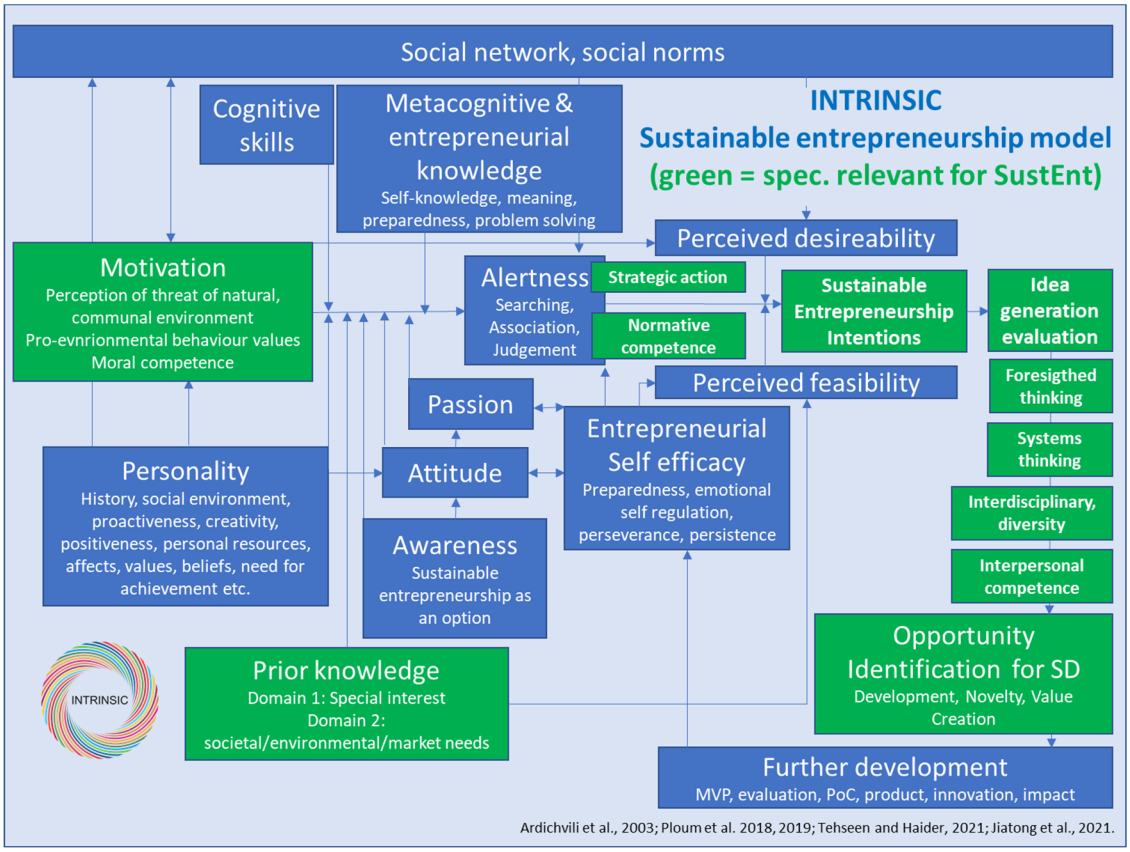


*Figure 3: The INTRINSIC sustainable entrepreneurship model; the green areas are specifically relevant for sustainable entrepreneurship.*

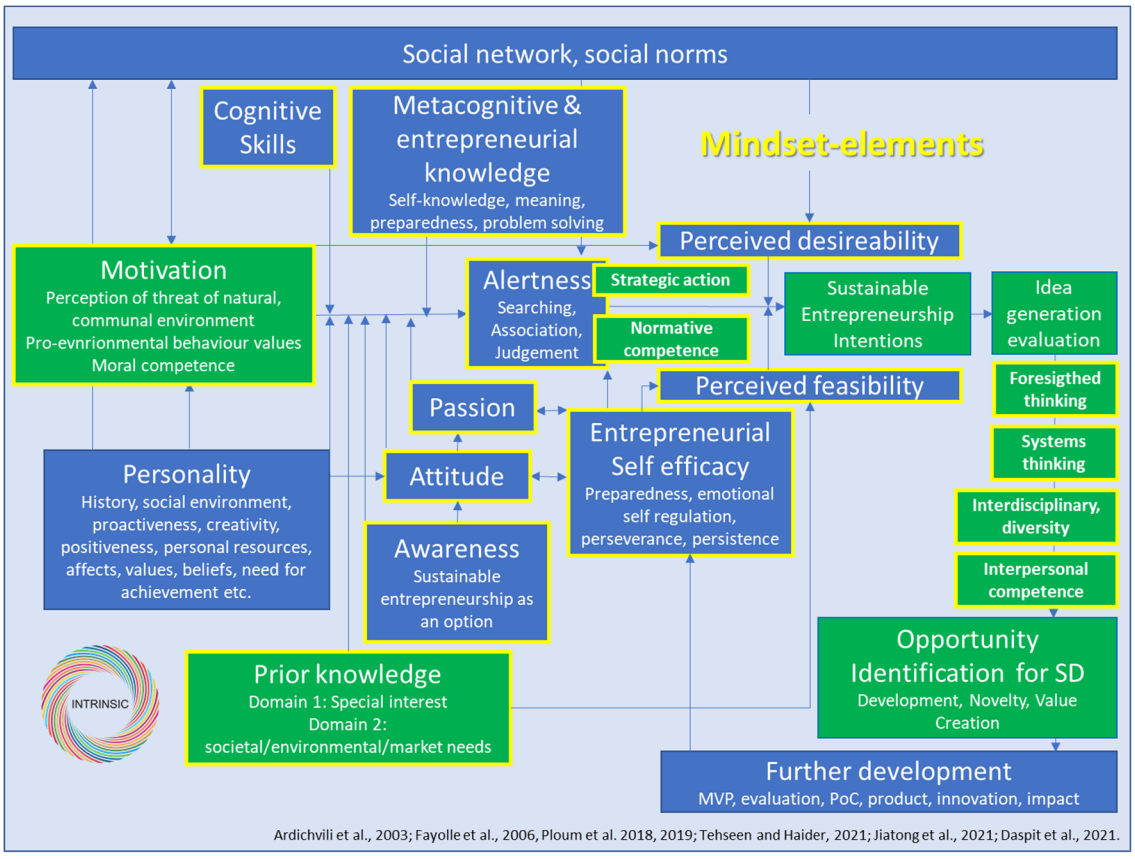


*Figure 4: The INTRINSIC sustainable entrepreneurship model; the areas with yellw borders represent core aspects of the sustainable entrepreneurial mindset.*

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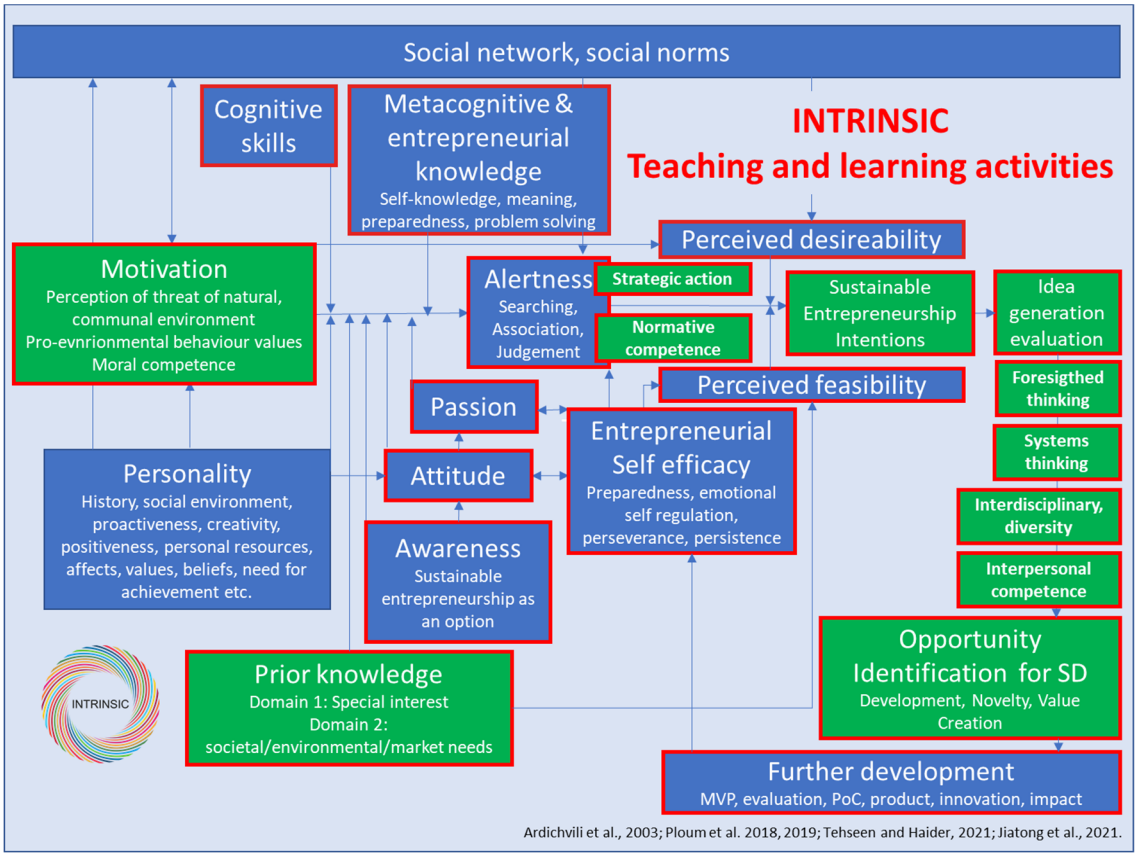


*Figure 5: The INTRINSIC sustainable entrepreneurship model; the areas with red borders are apsects that will be addressed by teaching activities.*

## 6. Entrepreneurship Teaching Models

The importance, that the educators understand different educational philosophies and theories underlying entrepreneurship education has been highlighted (Bell and Bell, 2020; Bell, 2021). It is important to understand, that entrepreneurial competences development over time (Daspit et al., 2021) and are stimulated by critical developmental learning experiences that involve emotions and affect (Krueger, 2007; 2017) (Fig. 6). Daniel (2016) describes, how the transition from entrepreneurial awareness to ideation and entrepreneurial behavior could be anticipated over time.

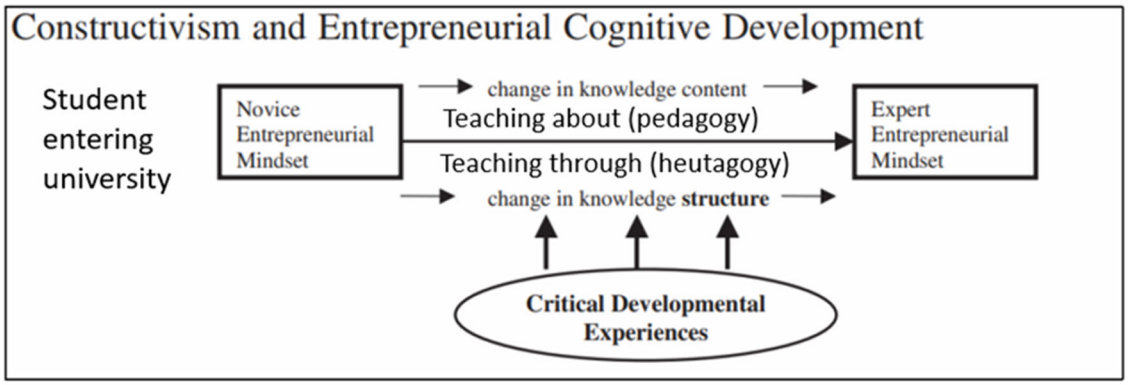


*Figure 6:Critical developmental experiences after a student enters university studies organized along different pedgaogical models, as main effect for changes in knowledge structure and its relation to the development of the entrepreneurial mindset (adapted after Krueger, 2007).*

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Only positive experiences in that field can support the development of an associated positive attitude and mindset towards entrepreneurship. Lackéus (2014) described how different experiential and emotional events are linked to specific related learning outcomes (e.g. increased self-efficacy, increased uncertainty and ambiguity tolerance, increased self-insight). Moberg (2011) also highlighted how various types of entrepreneurship education support the development of entrepreneurial self-efficacy as a starting point. INTRINSIC therefore takes a transformative learning perspective, as explicated by Freire (1990) or Mezirow (1997) reviewed later by Taylor (2007).

The QAA (2018) guideline discriminates between enterprise and entrepreneurship education. The differentiation between enterprise and entrepreneurship education hereby refers to different aspects of entrepreneurial activities, with enterprise education focusing more on aspects of the entrepreneurial mindset associated with supportive, competences, and soft skills such as such as creativity, flexibility and adaptability while entrepreneurship education has a narrow focus on startup and business knowledge training but is relying on the enterprising competences) (Penaluna and Penaluna, 2021).

Enterprise education is being defined

- “as the process of developing students in a manner that provides them with an enhanced capacity to generate ideas, and the behaviors, attributes, and competencies to make them happen. It extends beyond knowledge acquisition to a wide range of emotional, intellectual, social, cultural and practical behaviors, attributes and competences, and is appropriate to all students. These are all underlying factors that can enhance employability prospects as well as be taken further through entrepreneurship education. The aim of enterprise education is to produce graduates with an awareness, mindset and capability to generate original ideas in response to identified needs, opportunities and shortfalls, and the ability to act on them, even if circumstances are changing and ambiguous; in short, having an idea and making it happen.
    - Enterprise behaviors can include: taking the initiative, making things happen, reflecting, communicating, pivoting and adapting, storytelling, taking responsibility, networking, personal effectiveness and managed risk taking.
    - Enterprise attributes can include: open mindedness, proactivity, curiosity, self-efficacy, flexibility, adaptability, determination and resilience.
    - Enterprise competencies can include: intuitive decision making, identifying opportunities, creative problem solving, innovating, strategic thinking, design thinking, negotiation, communicating, influencing, leadership and financial, business and digital literacy.” (QAA, 2018)

Entrepreneurship education is being defined as

- “aiming to build upon the enterprising competencies of students who are capable of identifying opportunities and developing ventures, through becoming self-employed, setting up new businesses or developing and growing part of an existing venture. It

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focuses on the application of enterprising competencies and extends the learning environment into realistic risk environments that may include legal issues, funding issues, start-up and growth strategies.

- Students with both Enterprise and Entrepreneurship competencies may apply their abilities in a range of different contexts, including new or existing businesses, charities, non-governmental organizations, the public sector and social enterprises. Entrepreneurship Education is the realization of ideas, through an enhanced understanding and application of business processes within the legal and ethical constraints that are found in the context of their chosen venture". (QAA, 2018)

The QAA (2018) also describes the journey of a learner towards entrepreneurial effectiveness as ultimate goal of the education starting from

- awareness (what does enterprise mean to me), via the entrepreneurial mindset (personality and social identity, identity, ambition, motivation and goals, personal confidence and resilience, self-discipline and personal organization, extending beyond perceived limitations, tolerance of ambiguity and risk, reflection, on failure - to go forward, ethical, social and sustainable values)
- and entrepreneurial competences (creativity and innovation, opportunity recognition, creation and evaluation, decision making, implementation through leadership and management, reflection/reflexivity into action, communication and strategy, digital, data and media)
- towards entrepreneurial effectiveness (independent self-direction, goal setter, goal evaluator and reviewer, opportunity leader, data evaluator, business generator, value enhancer, value evaluator, market orientation, media communicator).

Entrepreneurial education is the term that encompasses both enterprise and entrepreneurship education (QAA, 2018). With regard to the enterprise-entrepreneurship distinction of the QAA (2018), INTRINSIC's focus is clearly on supporting the development of competences associated with enterprising.

Heutagogy as a learning theory of self-driven learning is of special interest, because it includes reflective double loop learning affecting initial beliefs and assumptions (Hase and Kenyon, 2007) (Fig. 7). An experiential learning approach including a reflective practice are key to develop entrepreneurial knowledge, skills and abilities and the associated higher level learning outcomes (Man, 2007). The promise of heutagogy, andragogy and adademagogy for entrepreneurship education have een extensively discussed by Jones et al. (2019).

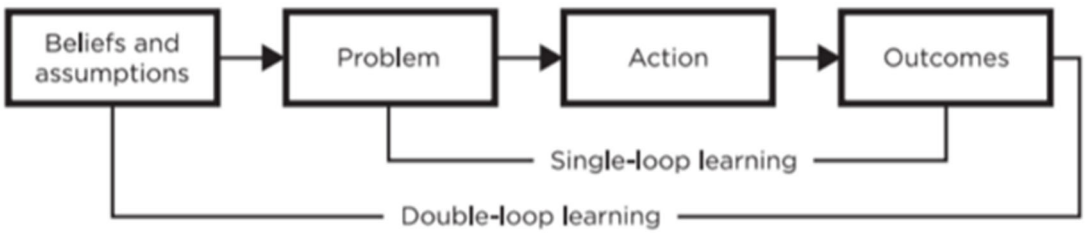


*Figure 7: Double loop learning affecting beliefs and assumtions in heutagogy (Moravec, 2019).*

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Several conceptual teaching models have been associated with entrepreneurship education. Krueger (2015) e.g. describes, how pedagogy has evolved from teacher centered to learning/learner centered, with high relevance of the most recent approaches to teaching based on problem-based learning and self-managed field projects. The necessary learning elements required for such a learning experience to be effective summarized by Krueger (2015) are:

1. Authentic (important to the learner) question
2. Personal reflection
3. Peer support (often peer mentors and peer learning)
4. Expert mentoring
5. Expert facilitators of the above.

Another model is of Seidel et al. (2020), who describe a teaching framework that includes two key pedagogical dimensions: the teaching method and the participant context. The teaching method dimension distinguishes analytical (concept-based) and experiential teaching activities. The second dimension considers the learning context that can be disciplinary or interdisciplinary. Combining the two dimensions yields four modes of teaching: analytical/disciplinary, experiential/disciplinary, analytical/interdisciplinary, and experiential/interdisciplinary. To teach innovation effectively, Seidel et al (2020) state, that students need to be exposed to all four modes of instruction with differing learning opportunities (Fayolle et al., 2021).

Wenger's (2009) social theory of learning also includes four dimensions: learning as doing; learning as experiencing; learning as becoming; and learning as belonging (Illeris, 2009; Klapper and Refai, 2015). Klapper and Refai (2015) combined that into the following principles in their Gestalt-model of entrepreneurial learning: Who learns what, how, why, with whom, where and when.

Fayolle and Toutain (2013) conceptualized entrepreneurship education by four educational principles:

1. learning to understand the interplay of multiple social interactions,
2. learning to navigate in a complex and dynamic environment,
3. learning how to build and permanently revise knowledge and strategies and
4. learning how to turn ideas into action.

Fink (2003) combined five components (learning how to learn, foundational domain knowledge, application skills including thinking skills, integration and connection skills, and understanding of the human dimension of oneself and others, and caring which means developing new feelings, interest and values) for the experience of significant learning

According to Baggen et al. (2021) in a wider perspective entrepreneurship education always includes:

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1. the entrepreneurial process of i) opportunity identification, ii) opportunity evaluation, and iii) opportunity exploration (i.e., getting into action)—either in that order or iteratively;
2. authentic, actual tasks with several solutions; and
3. the creation of new value for others.

Also Lackéus (2020b) refers to the creation of an artefact (a plan, a report, a concept, a prototype, some artwork etc.) as a core element characterizing experiental entrepreneurial education. Lackéus (2020b) also compares the different learning outcomes of three different pedagogical approaches (Idea and Artefact-Creation Pedagogy grounded in opportunity identification and creation, Value-Creation Pedagogy grounded in value creation and Venture-Creation Pedagogy). Jones et al. (2020) developed a spectrum of different value-creating activities/processes that can be used in enterprise and entrepreneurship education for the authentic development of value for oneself and others.

As an idea can have potential application routes (creative art, opportunity/problem, product or service, media like website or film, research, new project, social or sporting event, community or charity etc.), why their consequent evaluation by e.g. the DIFA scheme (Deman-Innovation-Feasibility-Attraction) seems a necessary pre-requisite for a successful implementation (Rae, 2015).

To make the entrepreneurial action more accessible to novices, INTRINSIC decided to link the sustainable entrepreneurship approach to the effectuation approach of Saras Sarasvathy, as effectuation emphasizes controlling the future rather than predicting it and is rooted in the realization that human beings cause the future and, therefore, the future can be controlled and/or created through consensual human action (Sarasvathy, 2009). By this approach, students get motivated to start with their own ideas and resources, and by the support of others, thinking about the affordable loss, can get entrepreneurial with limited risks. More information can be found at the webpage of the Effectuation Society (Fig. 8). At The Entrepreneurship Toolbox of the University of Copenhagen teaching materials related to effectuation can be found: https://innovationenglish.sites.ku.dk/model/sarasvathy-effectuation/. However, to discuss the applicability of effectuation comparison with other types of entrepreneurial reasoning with regard to different situations with students was recommend by Mansoori and Lackeus (2020).

Finally, Fig. 9 shows, based on Fayolle (2018), the generic teaching model of INTRINSIC.


*Figure 8: Effectual principles (Source: https://www.effectuation.org/).*

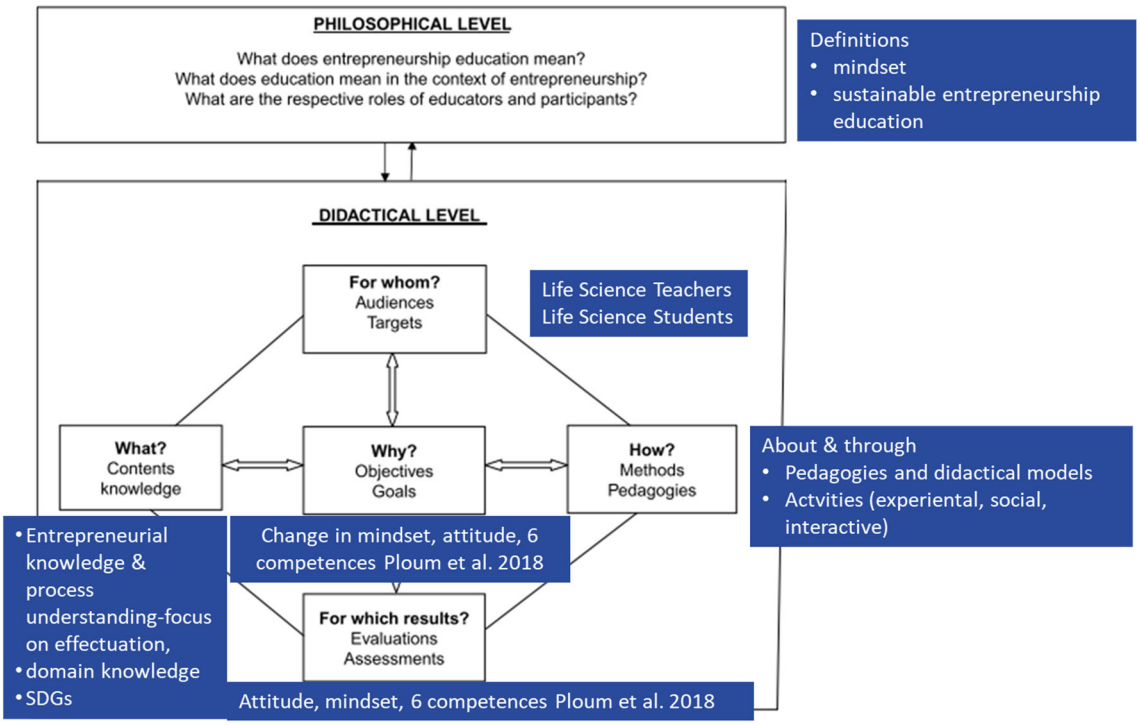


*Figure 9: INTRINSIC's generic teaching model, based on Fayolle (2018).*

## 7. Linking Sustainable Entrepreneurship Education and the SDGs

Increasingly, the achievement of the sustainable development goals (SDGs) is being related to successfully implemented innovative solutions, created by sustainable entrepreneurs (Esteves et al., 2021; Naderi et al., 2022). The SDGs have become an "inspiration for many types of entrepreneurship that combine value creation with conservation and social protection" (Crecente et al., 2021). Only recently, the achievement of the SDGs has been directly related to the targeted development of sustainable entrepreneurship competences in students (Naderi et al., 2022).

The SDGs have been ordered in different ways, to make them better understandable in terms of entrepreneurial actions addressing the goals, which can be ordered e.g. as situated on different levels along the environment-society continuum (Fig. 10).

(Dean and McMullen) already suggested in 2007 "that the magnitude of potential opportunities for sustainable entrepreneurship corresponds to the level of degradation of economically valuable environmental resources … increasing importance of opportunities for environmental entrepreneurship."

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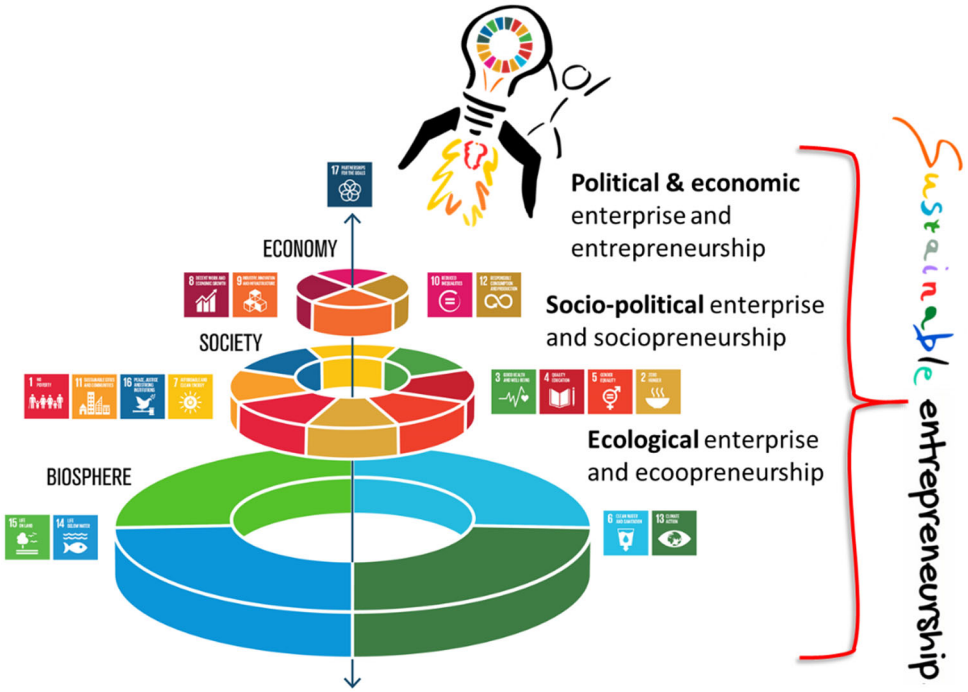


*Figure 10: The SGDs ordered along a hierarchical environment – society gradient (Credit: Azote Images for Stockholm Resilience Centre, Stockholm University. Image source: https://www.stockholmresilience.org/research/research-news/2016-06-14-how-food-connects-all-the-sdgs.html)*

Others have ranked them according to the Maslow pyramid of human needs (Fig. 11).

What is evident, is that the SDGs are interlinked, and that they have to be viewed from a systems perspective when they are tackled. This has been comprehensively tried by Institute for Global Environmental Strategies (IGES), who prove aSDG interlinkage tool https://sdginterlinkages.iges.jp covering countries of Asia and Africa.


*Figure 11: The SDGs ordered along the Maslow pyramid of needs (Image source: https://www.researchgate.net/publication/329528332_The_road_from_Millennium_Development_Goals_to_Sustainable_Development_Goals_A_Transition_in_Need_Hierarchy).*

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The three-horizon model (Fig. 12) of helps to put the SDGs into the perspective of a globally shared common perspective for a viable future, and to clearly highlight, that

- current drivers for unsustainable economic behaviours & innovations supporting H1 need to be addressed and changed via H2 innovations leading to H3,
- innovations that currently seem radical but will be normal in the future at horizon 3 and only sustainable entrepreneurs can deliver that,
- actual educational systems need reformation towards this perspective of a global sustainable change now.

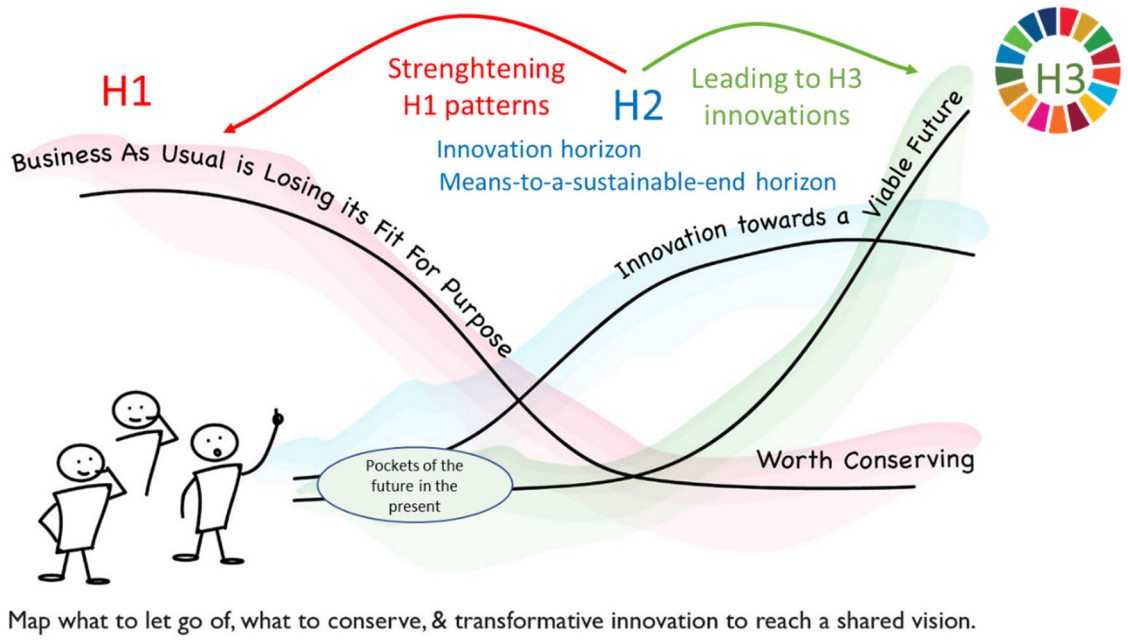


*Figure 12: The Three Horizons model of Sharpe et al. (2016) as model for sustainable entrepreneurship (Image source: https://www.h3uni.org/practices/foresight-three-horizons/)*

At the H3Uni Resource Library three method facilitation guides of apply the three-horizon model in teaching are shown (https://resources.h3uni.org/tutorial/three-horizons/). Environmental and social problems and the related SDGs are seen as potential opportunities, for which sustainable entrepreneurs can develop solutions (Fig. 13)

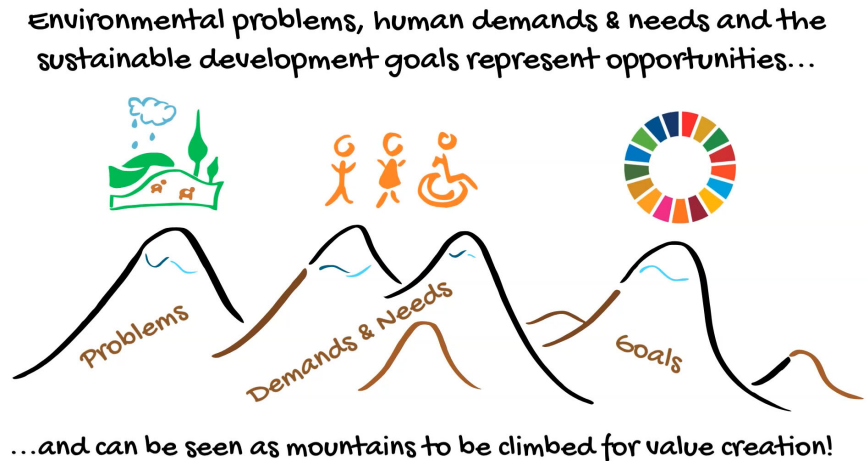


*Figure 13: Environmental problems, social needs and demands and the SGDs as opportunities (here represented as mountains to be climbed) for sustainable entrepreneurs (Source: INTRINSIC explanatory video on sustainable entrepreneurship combined with an effectual approach https://vimeo.com/396341075)*

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## 8. The Teacher's Role

The teachers and his/her motivations to foster the sustainable entrepreneurial mindset in their students is a key factor for the implementation of any related learning activity at higher education at Life Science universities (Jones, 2019). Teachers being innovative varying their teaching methods to foster an entrepreneurial mindset are a key factor for the future of sustainable entrepreneurship education at Life Science universities (Joensuu-Salo et al., 2021). Teachers trying to see the learning process through their students' eyes and anticipating their interests and needs are hereby more effective (Schneider and Preckel, 2017).

Teachers are responsible to design, create, accompany the learning experiences students are making. This approach has been formalized in the "Community of Inquiry" model, where the teaching presence, the cognitive presence and the social presence form the basis of successfully creating an engaging learning experience (Garrison et al., 2010). Teachers can provide their students a sense of achievement when exposing them to experiental tasks allowing students to expereince them as successful in managing complex situations and tasks (Schneider and Preckel, 2017).

Smith and Woodworth (2012) describe, how the input by the teacher (pedagogical content and techniques) targets specific outcomes on the student's side (shared identity, self-efficacy, and behavioral outcomes like an engagement in an entrepreneurial activity).

The combination of classroom and experiential learning has been recommended for a successful development of an entrepreneurial mindset that can be applied in a diverse set of circumstances focusing on the students' awareness of entrepreneurial heuristics, non-linear and effectual cognitive processes (Sardeshmukh and Smith-Nelson, 2011). Lackéus (2015) also provides a comprehensive overview on teaching approaches to entrepreneurship, e.g. focusing on educational design that creates possibilities for emotional experiences and experiental learning.

Bauman and Lucy (2021) recommend, that academic programs should provide a combination of theoretical and practical experiences and based on a comprehensive review, recommend teamwork as means to improve problem-solving, collaboration skills, and communication skills. In addition gamification, e-learning systems, entrepreneurial contests and challenges, mentorships, on-the-job training, and work-based training2 are recommended.

Learning activities for (sustainable) entrepreneurship should prepare students to handle unpredictable situations and deal with failure (Cualheta and Abbad, 2020).

There is also evidence, that the development of an entrepreneurial mindset can be fostered through inspiration from and engagement with role models (Fellnhofer, 2017).

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## 9. The Student's Perspective

Students at universities are preparing themselves for a life in independence, following their apsirations for a meaningful and succesful life. The exposure to the university learning can be a seen as a formative life course transition towards a life with financial security (Ranta et al., 2020). Again, "high self-efficacy beliefs and inoculation against setbacks are individual characteristics that contribute to individuals' adjustment to life transitions" (Lazarides et al., 2017). One core aspect is the development of "stress management skills that help individuals maintain goal-oriented behavior when they face barriers (Lazarides et al., 2017).

Aaltio and Wang (2015) describe entrepreneurship education as means to promote such competencies in students enabling them to transform their identities by experiental learning (doing, copying and learning from experience) and by focusing on the values, attitudes and capabilities that migh support students in their adaptation to unpredictable, changing requirements.

It can be also assumed, that humans in general are striving for developing a meaningful life and career (Malach-Pines, 2003). Entrepreneurship education by fostering the development of a sustainable entrepreneurial mindset can contribute to identify a personally meaningful career perspectives for one's professional life (Fayolle and Gailly, 2008). However, choosing a career can be considered as a "complex and multifaceted process that involves both conscious and unconscious choices" (Malach-Pines, 2003).

With regard to the aspect of meaning in life, Schnell (2020) identified four dimensions of meaning relevant for humans:

- coherence (all actions coherent with my self concept, supporting them, inerlinked, perceptions, aims and actions are in line and complement each other),
- efficacy/locus of control (my actions are resonating with the world, my actions have conseqeunces),
- orientation (ones own compass in life, helps in situaions where the overview is lost),
- belonging (being part of a bigger entitiy that satisfies the human need for acceeptance, empathy, security etc.; it can be expressed in many different forms, such as taling responsibility for family, friends, colleagues, nature, society etc.).

Role models as described by Fellnhofer (2017), can stimulate such a feeling of belonging, and also demonstrate how a potentially personally meaningful life as a sustainable entrepreneur could look like.

## 10. Assessment and Evaluation of Learning Outcomes

According to Man (2007) "understanding entrepreneurial learning is essential for the design of enterprise education and entrepreneurship training programmes." (Lackéus, 2013).

"From an educational perspective, the most important function of assessment is to provide learners and teachers with feedback about past progress and their needs for future

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developments (Hattie & Timperley, 2007)" (Schneider and Preckel, 2017). However, especially changes in mindsets cannot be easily assessed with conventional assessment methods typically applied in higher education settings.

One assessment option could be, to perform narrative interviews with participants, pre- and post a course and record how they describe themselves and the experiences and progress they have made with regard to their ideas (Rigg and O'Dwyer, 2012). Hägg (2021) describes reflective thinking (a reflective diary) as key to transform entrepreneurial experience into entrepreneurial knowledge.

As described by Krueger (2007) and Krueger (2017), the entrepreneurial mindset develops over time by critical learning incidents, that are able to change not only what we know, but also how we know. It cannot be foreseen, when such critical learning appears, nor is it easy to capture the result of a changed perspective. That is why different approaches have been developed, to capture such deep changes and dynamic changes of the mindset over a longer period of time, also trying to relate them to specific activities to open the black box of entrepreneurial learning (Baggen et al., 2018; Lackéus, 2020c; Lackéus, 2020a). Most recently, situational judgement tests have been suggested as means to evaluate the behavioral choices that entrepreneurs make when exposed to (theoretical) situations (Cualheta and Abbad, 2020).

Penaluna and Penaluna (2020) introduced the Crit, a common feature of Art and Design courses, as a tool of assessment, where "students are expected to communicate and debate their thinking processes and enter into a discussion of their work with tutors and peers" about their design ideas. The Crit can be seen as a "learning through assessment" approach, that supports learners to develop argumentation or "pitch" skills.

## 11. A Signature Pedagogy for the Entrepreneurial Mindset

Entrepreneurship education has moved away from traditional approaches such as lectures towards more practical learning emphasizing real-world opportunities and experience as an effective teaching method, with problem-based learning, student business start-ups, live cases, and simulations being used as key pedagogical methods (Peschl et al., 2021).

Peschl et al. (2021), based on a comprehensive literature review, describe a signature pedagogy targeting the development of an entrepreneurial mindset and associated skills, that well fits the INTRINSIC approach:

- learning through experiential activities in uncertain turbulent context faced by entrepreneurs which should be experienced by students,
- a flipped classroom approach allowing instructors to work within a series of experiential activities, rather than just transmitting content.
- based on the assumption that the best way to convey entrepreneurial knowledge is through adaptive anxiety providing students the opportunity to fail forward.
- focus on the development of a specific associated skillset.

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Signature pedagogies “are types of teaching that organize the fundamental ways in which future practitioners are educated for their new professions. In these signature pedagogies, the novices are instructed in critical aspects of the three fundamental dimensions of professional work –to think, to perform, and to act with integrity” (Shulman, 2005).

That learning can be made more meaningful using ”project-based learning arrangements, where groups of students work on complex authentic tasks over extended periods of time and have to structure their own problem-solving process under the supervision of a teacher or a tutor” (Schneider and Preckel, 2017) is generally accepted.

Teacher–student interactions combined with student–student interactions lay the foundation for high-performing students in general (Schneider and Preckel, 2017).

## 12. Summary of selected Case Studies

In this chapter, selected relevant studies, projects and methodological approaches related to develop sustainable entrepreneurship competences are presented.

### 12.1 Summary chapter: Competences for Sustainable Entrepreneurship (Ploum, 2019)

Despite the growing interest in sustainable development in all layers of society, it remains difficult to fully reach the potential sustainable entrepreneurs can have in the transformation towards a more sustainable society. Nevertheless, focusing on developing specific competences for sustainable entrepreneurship might mitigate and overcome challenges that are inherent to this transition toward a more sustainable society in which there is inclusive and sustainable economic growth, employment, and decent work for all.

This chapter in the reference work on all the SDGs covers an overview of most recent studies on competencies in the domain of change agents for sustainable development in a broad sense and more specifically, zooms in on the competencies for sustainable entrepreneurship. The chapter defines sustainable entrepreneurship as the ultimate balance in the competing demands for environmental protection and economic development, emphasizing economic, ecological, and social goals in equal degrees. Furthermore, this chapter takes the angle of the individual involved in sustainable entrepreneurship and calls them change agents for sustainable development. These change agents or sustainable entrepreneurs are described as those individuals who holistically integrate the goals of economic, social, and environmental entrepreneurship into an organization that is sustainable in its goal and sustainable in its form of wealth generation.

The chapter focuses on several different studies that have described different relevant competences and, in the end, defines the six most relevant ones for sustainable entrepreneurship. Whereas most other competencies have not yet been validated, the six competencies below have been extensively. In addition, no other framework has been developed that specifically focuses on sustainable entrepreneurship. The six competencies are:

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1. Embracing diversity and interdisciplinarity competence: the ability to structure relations, spot issues, and recognize the legitimacy of other viewpoints (i.e., stakeholders) in business decision-making processes, be it about environmental, social, and/or economic issues
2. Foresighted thinking competence: the ability to collectively analyze, evaluate, and craft "pictures" of the future in which the impact of local and/or short-term decisions on environmental, social, and economic issues is viewed on a global/cosmopolitan scale and in the long term
3. Systems thinking competence: the ability to identify and analyze all relevant (sub)systems across different domains (people, profit, planet) and disciplines, including their boundaries
4. Interpersonal competence: the ability to motivate, enable, and facilitate collaborative and participatory sustainability activities and research
5. Normative competence: the ability to map, apply, and reconcile sustainability values, principles, and targets with internal and external stakeholders, without embracing any given norm, but based on the good character of the one who is involved in sustainability issues.
6. Strategic action competence: the ability to collectively design projects; implement interventions, transitions, and strategies; and translate these strategies to responsible actions for the improvement of the sustainability of social ecological systems.

This synthesis of the most recent studies on competencies for sustainable entrepreneurship calls for a more in-depth and empirical analysis of the competencies at stake when dealing with sustainability challenges, especially in a higher education context.

## 12.2 How to build a Sustainable Business Model

The Business Model Canvas was originally developed by Osterwalder and Pigneur and serves to visualize and analyze business models (Osterwalder and Pigneur, 2010). Nowadays, the Canvas model is widely used for start-up management and has become the standard for start-up presentations and workshops (Blank and Dorf, 2020). The Manual *Developing business models with the Sustainable Business Canvas: Manual for conducting workshops* (Tiemann and Fichter, 2016) represents a model that - on the basis of the Business Model Canvas - enables sustainability-oriented development of business models: the Sustainable Business Canvas Model.

The Sustainable Business Canvas serves as a foundation for the systematic development of sustainability-oriented business models in the context of an interactive workshop.

A business model is an abstract representation of how an organization creates value (What value? For whom?), delivers value (How produced? Which partners?) and captures value (Costs? Revenue streams?).

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A sustainable business model has a broader perspective than only economic sustainability. 4 principles must be considered: sustainability orientation, extended value creation, systemic thinking, stakeholder integration (Breuer et al., 2018).

A sustainable business model creates an economic, social and environmental value delivered in a sustainable way and assessed (cost and revenues) on a sustainable point of view (economic but also social and ecological). A holistic, integrated approach to sustainability has to be considered in all the aspects of the business model (Mewes H., FU-BEST Digital Lecture Series).

The manual employs an integrated approach in which both classical and sustainability-oriented questions concerning the business model are asked in relation to each of its elements: Vision & mission, Value proposition, Customers, Competitors, Relevant stakeholders (= how to create value); Key activities, Key resources, Key partnerships (= how to deliver value); Cost structure and Revenue model (= how to assess value).

Furthermore, it provides links to further analytical tools, a collection of relevant online videos and contents, materials for facilitators, schedules for workshops and a handout model for participants.

## 12.3 Sustainable Entrepreneurship Projects at the Agricultural University Athens (AUA)

Recently AUA participated as a partner in two EU projects related to sustainable entrepreneurship. Below you can find some information about these projects.

### FARMPATH - Farming Transitions: Pathways Towards Regional Sustainability of Agriculture in Europe (https://cordis.europa.eu/project/id/265394/reporting)

The overall goal of FarmPath was to identify and assess future transition pathways towards regional sustainability of agriculture in Europe, and the social and technological innovation needs required to initiate and progress along these pathways. Specifically, the project focused on 'emerging transitions': processes that had the potential to significantly impact on sustainability of agriculture at regional level. The project was broadly divided into two phases of research: case studies of emerging agricultural transitions, and identification of transition pathways. Intersecting with these two phases was the ongoing development of a conceptual framework, and research on the role of young farmers and new entrants in transition processes. The consortium was comprised of nine research institutions from eight European countries. Research was undertaken in seven of these countries: Bulgaria, the Czech Republic, France, Germany, Greece, Portugal and the United Kingdom.

### SALSA - Small farms, small food businesses and sustainable food security (https://www.aua.gr/tsili/Salsa.html)

SALSA assessed the role of small farms and small food businesses in delivering a sustainable and secure supply of affordable, nutritious and culturally adequate food. SALSA will identify the mechanisms which, at different scales, can strengthen the role of small farms in food systems and thereby support sustainable Food and Nutrition Security (FNS). By considering a gradient of 30 reference regions in Europe and in Africa, Salsa obtained a differentiated

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understanding of the role of small farms and small food businesses in very differently structured food systems and situations.

SALSA elaborated and implemented a transdisciplinary, multi-scale approach that builds on and connects relevant theoretical and analytical frameworks within a food systems approach, and that uses qualitative, consultative and quantitative methods. A new combination of data-based methods and tools (including satellite technologies) for rigorously assessing in quantitative terms the interrelationships between small farms, other small food businesses and FNS, paying particular attention to limiting and enabling factors was tested. SALSA used participatory methods, at regional level, and established a more global Community of Practice and multi-stakeholder learning platform, based on FAO's TECA online communication and learning platform.

The SALSA consortium, and the joint learning and close cooperation, have both been designed with the EU - Africa dialogue in mind. Responding to the call SALSA aimed at unraveling the complex interrelationships between small farms, small food businesses and FNS, and unfold the role played by small farms in (a) the balance between the different dimensions of sustainability, (b) maintaining more diverse production systems, (c) supporting the urban/rural balance in terms of labor and (d) in facilitating territorial development in countries facing a strong rural population growth.

## 12.4 Student Entrepreneurship awards 2020 at Agricultural University Athens (AUA)

### Press release – 3rd Business Idea Competition

The 3rd AUA Business Idea Competition organized by the Office of Innovation, Entrepreneurship & Technology Transfer (InnovInAgri) of the Special Account for Research Funds of the Agricultural University of Athens, was successfully completed, in an online event held on the 11th of July with the support of the Athens Stock Exchange, which was the Action Sponsor of the Competition on the "Presentation and Award of Business Plans of Food and Agriculture Companies".

The event was prefaced by Mr. Spyridon Kintzios, Rector of the Agricultural University of Athens, Mrs. Peggy Papastavrou, Director of the Securities & Issuers Department of the Athens Stock Exchange Group and Mr. Stavros Zografakis, Vice Chancellor of the University of Athens.

During the event the competing teams presented 5 complete business plans to representatives of the business world as well as to academics and wider stakeholders. The nomination of the winning teams was carried out by an Evaluation Committee, which consisted of Mr. S. Arsenis, Coordinator of the NBG Business Seeds Program of the National Bank, Mr. I. Batsis, President of Geothermal SA. and Ms. L. Panagiotopoulou, Chair of the Committee on Education, Innovation and Entrepreneurship, Hellenic-American Chamber of Commerce, where everyone referred to the high quality of the business plans.

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The ranking of the winning teams was as follows:

- The 1st place was taken by the team of milk thistle – coffee,
- The 2nd place was taken by the team of AgroSafe, and
- The 3rd place was taken by the GreCoS team

The winning teams were awarded cash prizes sponsored by the Athens Stock Exchange.

### The teams that competed

The business plans that competed utilized a variety of subjects in which a high level of innovative research is carried out at the Agricultural University of Athens. Below you can find brief descriptions of the six teams that competed.

1. Milk thistle-coffee substitute. A thorn to drink!

   Coffee substitute, from roasted organic thistle fruits, in two types: espresso, or cold brew. An alternative drink of enjoyment and well-being, for the detoxification of the body from chemical food additives, from environmental pollutants, but also from the toxins produced by the human body itself. This is a unique product of its kind.

2. GreCoS: The ultimate IoT in agriculture, TÄKon's first product

   GreCoS (Greenhouse Companion System) is a smart head system that aims to help the farmer optimally manage the various elements of his crop, targeted, at any time, through voice commands.

3. Precision farming, certification, and sanitation services

   AgroSafe is a precision farming company that focuses on the study of the microbiome to provide innovative services. AgroSafe aims to improve the existing facilities of precision farming companies, improve farmers' incomes, provide certification of safe cultivation, and undertake health inspections by government agencies.

4. Robotic weed control vehicle

   The G.R.F. (Greek Robotic Farming) aims to reshape the agricultural machinery industry, with its first product being R.W.B. (Robo Weeder Bullet), an energy-independent robotic system of small size and weight, capable of removing weeds from linear crops, without the use of chemicals. The G.R.F. envisions becoming an essential part of agriculture, developing many different solutions for the needs of the farmer and using robotic technology to optimize the production process.

5. Ecological straws from olive cultivation by-products

   Strawleaf, utilizing the by-products of olive cultivation (leaves and branches), produces ecological straws and aims to address the problems of the existing ones. Giving value to the natural Greek wealth and utilizing the Greek know-how, it innovates in the ecological straws and offers new ecological solutions.

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## 12.5 Enterprise and Entrepreneurship Education Toolkit (https://www.etctoolkit.org.uk/)

The website was developed by the University South Wales and aims to provide a set of tools for improving the curriculum in enterprise and entrepreneurship education based on the benchmarks set by the UK Quality Assurance Agency (QAA). It provides toolkits for ten different subjects. Each toolkit is a collection of different practices and serves as an online resource developed by teachers for teachers to provide a bank of resources designed to develop skills and confidence in learners. The idea behind the website is to ensure that teachers have access to information relevant to their own subjects through this valuable resource.

Within the Agriculture, Horticulture, Forestry, Food and Consumer Science section it offers the tools to guide the learning process and also provides case studies. Each tool is described in such a way that the objective and overview as well as the activity are described in detail. It also explains the types of skills that can be developed in students. Additional resources to learn more about the tool are also provided. Case studies are similarly described. The objectives of each exercise are in line with the QAA benchmarks and some of these include: creative thinking, structured group problem solving, evaluating ideas through critical analysis and judgement , presenting ideas, understanding team dynamics and how teams come together to achieve a goal, exploring and establishing production methods for a simple product, understanding the power and necessity of reviewing and reflecting on a task or situation, understanding processes and procedures, replicating methods, and many others. The activities are described in detail, and it is very easy to follow the instructions.

A variety of tools are provided such as Creativity and Evaluation Using Questioning SCAMPER, Production line, Interpersonal Icebreaker: Line of Evaluation, Problem Solving and Consensus Building, Opportunity Recognition 'Solution Conference', Creative Problem Solving What can I do when...?, Teaching Entrepreneurship: A Practice-Based Approach, Design Thinking: From creative thinking to enterprising action and Teaching Entrepreneurship A Practice Based Approach Exercise Business Model Canvas Game. The good point is that the page is open for additional sources to be added.

## 12.6 BOKU CASE (Competencies for a Sustainable Socio-Economical Development) Project (https://www.case-ka.eu/index.html%3Fp=2740.html)

The CASE project collected the most relevant teaching and learning approaches for Higher Education for sustainable development and Higher Education for entrepreneurship. The core idea and the main objective focusing of its use in the above-mentioned domains are explained in detail, and linkages to other approaches are shown. Further literature is provided for a deeper understanding of the approach. The described identified teaching methods were:

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- Active learning
- Learner-centered learning
- Reflective learning
- Collaborative learning
- Experiential learning
- Problem-based learning
- Interdisciplinary learning
- Transdisciplinary learning
- Transformative learning

Furthermore, nine cooperation formats address topics and methods important to foster competencies for sustainability-driven entrepreneurship. A practical cooperation guide presents these nine cooperation formats and highlights concrete benefits, success factors and challenges for users. Important steps are explained for necessary preparation and implementation phases (https://www.case-ka.eu/index.html%3Fp=972.html).

The described formats are:

**Project-based formats**

- Service Learning
- Participatory Research Project
- Entrepreneurial projects ...
- Case Study in Sustainable Development
- Sustainability Screening

**In the field**

- Internship/Practice
- Field trip complemented by case study
- Excursion

**In the classroom**

- Guest lecture

## 13. Mapping of Courses and Course Formats at partners within INTRINSIC

This chapter will present courses mapped at partner institutions of the INTRINSIC project. During the INTRINSIC project, a teacher course mapping task was done to map the courses which include activities that could be considered as fostering the sustainable entrepreneurial mindset. Summaries of the course mappings are presented first, after which the best practices mentioned by the teachers are presented.

### 13.1 Wageningen University (WU)

In total at WU 5 in-depth interviews with different teachers were held, and in addition 2 additional focus group discussions with over 10 teachers to discuss their courses/programs and the involvement of the competencies for sustainable entrepreneurship in their courses

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were organized. The courses analyzed more in depth are called Insects in Food and Feed, Studio Participative Planning, Biotechnology II, Case studies Food Quality and Economics of Science and Technology. The focus group discussions were part of two separate meetings organized by us and open to all teachers interested in entrepreneurship. We did not go too much in detail during these discussions but did get some good insights on 'best practices' already existing in courses that we did not know about and have a link to the competencies for sustainable entrepreneurship.

What stood out from the interviews and conversations held during the focus group discussion was that to some extend most of the competencies for sustainable entrepreneurship were present in the courses. Especially the ones more related to sustainable development such as systems thinking, and diversity thinking were easier to link to the different learning outcomes and activities of the courses. This is also something that we could have expected, as some of the courses already are more focused on sustainability in general. Also, when linking this to the pyramid we have made in terms of familiarity of the competencies it stood out that the 'lower' ranking competencies like interpersonal, diversity and systems thinking were recognized more by the teachers than the 'higher' level ones like normative, strategic action and foresighted thinking. One of the most striking insights gained from the interviews was that normative competence is often not mentioned as a core competence in the courses mapped. None of the mapped courses points out that a value orientation or discussion of social-ethical dilemmas is really present in the course. Some of them mentioned that it is implicitly there, but not really focused upon. In addition, strategic action competence is harder to establish as most courses do not go to the extent of action execution of the projects or actionable behavior.

In terms of teaching activities, it stands out that most of these courses include some kind of group work and report writing, alongside for example a written exam. Some of the competencies like interpersonal and diversity thinking are more often linked with this group work activity. Also, cases are often used as an instrument for real-life learning, however some questions about the authenticity can be raised as most of the times the cases are very research oriented. Furthermore, guest lectures are often used to include a real-life (entrepreneurial) perspective, but actual interaction with stakeholders is still relatively limited. A final remark can be made in relation to collaboration with the Entrepreneurship @WUR team. Most of the teachers were not aware of the fact that they can get help from the university team and that they can use expertise on the topic of sustainable entrepreneurship from the team working on this topic for the university. So, the link to the student incubator can be much stronger in already existing courses.

All in all, some of the competencies are already being developed in existing courses within the Wageningen university. Nevertheless, there is room for improvement. Especially in terms of the development of the more complex competencies for sustainable entrepreneurship.

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## 13.2 University of Teramo (UniTE)

The following five courses were selected and for each one a thorough interview was conducted.

- Greenhouse Technology
- Food Engineering
- Applied thermodynamics
- Postharvest Technology
- Political Economy of the Agri-food Sector

For each course a different teacher was responsible so different personal opinions and teaching approaches were recorded. At the stage of the organization of the interview the first reaction of all the teachers was to express their doubts concerning the relation of their course to entrepreneurship. However, after some explanations we gave to them the teachers agreed to participate and personal interviews were conducted.

All the teachers easily completed the general data. However, from the answers obtained it must be mentioned that four out of five teachers could not link their course to the Sustainable Developmental Goals. Only one teacher mentioned that his course (Political Economy of the Agri-food Sector) has some relation to the following SDGs, 1: End poverty in all its forms everywhere, 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture, 3: Ensure healthy lives and promote well-being for all at all ages.

From the responses of the teachers concerning the sustainable entrepreneurship competencies the conclusion that can be drawn is that they have not a systematic approach to fostering the competencies of their students. Most of them are focusing on the conventional methods of teaching (lectures and team tasks), and only individual efforts are made in the direction of motivating students towards sustainable entrepreneurship competencies. A factor that seems to play a key role in the teaching approach of the courses is that the nature of the courses is technical. The teachers stay to the basic technical aspects of the course using classical teaching (lectures) and they overlook the entrepreneurship competence skills.

The teachers use teaching material (i.e. presentations (PP), short videos) which they upload to the course's website, on the university's electronic platform (e-class) or in Dropbox, in order to be accessible by the students. However, none of them provided links of such material or tool for the INTRINSIC network as it was asked.

Regarding the table with the competencies as defined by Ploum, only one teacher could provide answers only for three of the questions. The rest of the teachers mentioned again the technical nature of the course and the inability to connect it to sustainable entrepreneurship.

As a general remark it is noted that sustainable entrepreneurship issues have not yet been incorporated in the teaching procedure for most of the courses of technical nature in the undergraduate curriculum.

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### Wine and agri-food marketing, Faculty of Bioscience and Technology for Food, Agriculture and Environment, University of Teramo

Two courses have been mapped concerning marketing and agri-food business in the Faculty of Bioscience and Technology for Food, Agriculture and Environment: Legislation and marketing in wine enterprises (Bachelor, 3° year) and Marketing and agri-food business (Master, 1° year).

Both courses focus on marketing and are second level courses in the economic and management field. One concerns specifically the wine sector and the other addresses the agri-food sector in general.

The courses provide students with a marketing orientation, through the knowledge of marketing principles and tools, in the framework of agri-food markets and regulation. In the courses students become aware of the instruments necessary for a marketing approach and are stimulated to put in relation their knowledge on products and producing technics with market opportunities. They reflect on how to create a product-market fit.

This approach could be applied both in the framework of a company organization (often the family company) and in connection with a self-entrepreneurial activity.

Specific aspects of products differentiation and innovation related to sustainability are taken in account: environmental sustainability concerning production techniques, environmental labels (carbon footprint, organic), sustainable packaging; social sustainability related to local territorial development, cooperatives, family farming, use of local resources.

The courses are a mix of theoretical knowledge, applied knowledge, experiential learning and project-based learning. The sustainable entrepreneurship mindset is assessed trough the *Intrinsic Entrepreneur Monitoring App* at the beginning and the end of the courses.

Some limitations emerge concerning the capacity of the courses to implement a broader vision of sustainability (in creating, delivering and assessing value), to focus on value orientation or discussion of social-ethical dilemmas, the assessment of results not only in competences but also in mindset changes. The real-life (entrepreneurial) perspective and interaction with stakeholders is still limited.

## 13.3 University of Helsinki (UH)

In total, 6 interviews were held with the teachers. On the interviews, some common notions were multidisciplinarity of the courses and wide variety of teaching and learning methods: project-based (e.g., case studies), problem-based, experiential learning and overall group work. Course assessments did not generally have a specific focus on the sustainable entrepreneurship education goals. Two courses had SDGs implemented on them (packaging of the food, bio-energy practicalities, and food production techniques). Three courses did not, unless the students themselves included them on their case studies.

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## 13.4 University of Zagreb Faculty of Agriculture (FAZ)

In total, 5 in-depth interviews with different teachers were conducted at FAZ. The courses that were analyzed in more detail are Secondary Animal Products, Agribusiness Supply Chain, Economics of Food Industry, Analytical Chemistry and Laboratory Methods, and Microbial Enzymatic Activities in Soil.

One-on-one interviews with teachers were organized and we asked teachers to participate in the interviews. After the initial reaction of some teachers who expressed doubts that their course did not have much to do with entrepreneurship, we presented some examples of "best practices" that already exist in courses that we did not know and that have a link to the competences for sustainable entrepreneurship.

What is evident from the questionnaires is that all courses have a connection to Sustainable Developmental Goals and the teachers identified the most important SDGs.

When asked about the competencies for sustainable entrepreneurship, teachers were not sure if they were developing them. However, it was clear from their responses that they are promoted in different ways, depending on the courses. Mainly, teachers nurture them by identifying new opportunities or possible solutions to problems, and to some extent many of the sustainable entrepreneurship competences were present in the courses. Although the learning outcomes of many courses include aspects of enterprise and entrepreneurship, they are not always aligned with the assessment criteria. The competences that relate to sustainable development, such as systems thinking, were easier to link to the various learning outcomes and activities in the courses. This is also something we might have expected, as some of the courses are already more focused on sustainability in general. Of all the competences, the one related to strategic action is recognized at a lower level.

All teachers indicated that they organize different activities such as group work, case study analysis, presentations and/or report writing. And these activities are often combined in the same course. Interactive teaching is recognized by teachers as necessary to motivate students and encourage their engagement. Even though some of the competences are recognized and attempts are made to develop them in existing courses at the university Zagreb Faculty, there is room for improvement.

## 13.5 University of Natural Resources and Life Sciences Vienna (BOKU

### University courses related to sustainable entrepreneurship

At BOKU a wide variety of courses could be identified, that are dealing with the development of competences related to the sustainable entrepreneurial mindset. However, the courses are not interlinked, and artefacts are created only in rare cases. The courses identified and linked to the specific competence for sustainable entrepreneurship are described below.

Sustainable entrepreneurial competences

- Sustainable entrepreneurship and sustainability challenge: both courses focus on working on complex projects and associated problems, to consider the related

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environment and all relevant stakeholders, to structure knowledge and experience and make it available, to develop a business plan for an environmental consulting enterprise, to gather financial resources, to develop ideas and realization strategies in the field of sustainable business management, to gain knowledge of $CO^2$-compensation in the field of mobility

- THINK+MAKE: Product innovations with renewable resources: this course consists of lectures to topics like e.g. cradle to cradle, patents, innovations, bio economy, presentation technics as input for the following teamwork to develop an innovation with biobased materials. The goal of this course is to learn, understand and apply creative processes; design and implement sample solutions, good communication within the team or with third-party partners; improve teamwork; know and implement technical-scientific solutions; understand innovative development processes and improve presentation skills; recognize and act on implementation options. The ultimate goal is to develop an innovative idea, do prototyping and present it. Evaluation method is project presentation and discussion. It was realized during the discussions, that a monitoring of the growth of the sustainable entrepreneurial mindset would be very interesting using the Entrepreneur monitoring App.
- Start-up: your business (in Eng.): You have an innovative business idea in the bioeconomy, but no clue about business management? This course gives you the opportunity to develop your strategy by planning finances and investment, selecting the appropriate legal form and assessing tax implications. You collaborate closely with the professor, he is your business coach. This course starts, where other entrepreneurship courses end. This means, that participants already have developed their business idea ready for the market. Now it's time for realization. We address the hard business facts needed to start the company. Participants may look at all of the above mentioned aspects or focus on specific problems (e.g. finances or taxes).
  Upon completion of the course, students
  + are able to develop an economically sustainable business strategy
  + can design a financial and investment plan
  + can differentiate between various legal forms and understand their implications
  + are familiar with the relevant aspects of business taxation
  The evaluation is based on active participation and a final report. It was concluded during the discussion, that a self-refelctive diary could be an interesting add on to accompany the learning experience, as the topic is usually quite challenging for students.

Systems thinking

- Systems science for participatory management of dynamic socio-ecosystems (in Eng.)
- System analysis and scenario technique - methods and practices (in Eng.)
- Multi-scale modelling and system dynamics in aquatic ecosystems (in Eng.)
- Mediated modeling for sustainability (in Eng.)

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Interdisciplinarity and systems understanding

- Interdisciplinary concepts in understanding river-society interactions (in Eng.)

Strategic action

- Strategic management (in Eng.): To persist, farms need to cope with a rapidly changing environment. To effectively deal with change, farmers need to acquire skills in strategic management. These include the ability to read change in the external environment, define and redefine organizational purpose, as well as handle the complex trade-offs between demand by customers, resource constraints, and shifting relationships (on- and off-farm) while taking into account path-dependency. Thus, strategy formulation involves understanding the dynamics in the economic, social and natural environment, assessing the possible impacts of technological and regulatory change, recognizing opportunities, all the while taking into account the preferences of various family members. Farmers thus need to develop the ability to compete (e.g. on markets) as well as to cooperate (e.g. with regional partners) in an environment subject to unpredictable changes.

  Upon completion of the course, students can:
  - distinguish different approaches and understandings of 'strategic management' and apply it in the farming context;
  - present a convincing argument, using of carefully selected scientific texts and evidence;
  - write a text that is well-structured and concise, using exact and clear wording;
  - reflect on the strengths and weaknesses of their work habits.

Foresighted thinking

- Foresights - what future to expect? (in Eng.) (Late lessons from early warnings): focus of the course is to make students aware of essential global developments in the world and have an understanding of some methods to address future developments. They understand the value of foresights and their limitations. It turned out in the discussion, that also normative values are addressed.

Normative competence, responsibility

- Corporate sustainability (in Eng.):
  The students who have completed the course are able to:
  - distinguish between various approaches to corporate responsibility
  - draft proposals to implement measures of corporate responsibility
  - recognize the ethical dimension of business choices.

In most courses active collaboration reflective discussions and essays are used as assessment/evaluation instruments. In some courses (Sustainability challenge), real concepts need to be developed, presented and discussed. However, some courses do not have innovations as goal, but still foster the associated competence.

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Interpersonal competence, normative competence and strategic are covered only in specific settings. There is room, to further implement targeted activities to foster theses skills.

The main outcome of the discussions with the teachers, was the wish to streamline the existing courses along the idea of the systematic development of the sustainable entrepreneurial mindset in students of BOKU. Also, a better link to and coordination with experiential activities to apply the competences in authentic settings are needed. This could be achieved by linking the teaching offered in courses to the activities organized and provided by the BOKU:Base, but also to link to more content- and domain driven courses.

Also, a joint evaluation strategy, also over the long term, to document the development and growth of the student's sustainable entrepreneurial mindset was of interest for the teachers.

### BOKU:Base – BOKU Activities Supporting Entrepreneurship (https://base.boku.ac.at/)

BOKU:Base as a newly established campus initiative supports and facilitates the development of knowledge, skills and attitudes for students with regard sustainable entrepreneurship. It builds on a broad network of partners, that provide experiential learning activities to students. As such BOKU:Base is an important complementary offer to BOKU students accompanying the approach developed in INTRINSIC. However, up to now there was no plan how to monitor the outcomes of the activities associated with BOKU:Base, why the use of the INTRINSIC Entrepreneur Monitoring App was planned, which will provide insight into how different types of activities are able to shape the entrepreneurial mindset.

Associated activities are the [sic!]- students' innovation center, ECN BOKU (Entrepreneurship Centre Network), Joint Forces is a regular event in cooperation with the University for Economy and the Technological University Vienna offers students a platform to pitch their ideas, projects or startups, get feedback from like-minded people and build a network within the community.

## 14. Recommendations and Good Practices

In this report, a "good practice" is defined as a teaching/learning technique or method, that has been generally understood as a superior to any alternative methods or techniques, related to sustainable entrepreneurship education. Recommendations and good practices derived from literature and the participating universities are described below.

INTRINSIC's teaching approach

- builds on a review of accepted / proposed educational models,
- starts with the teachers, who play a significant role in the developing the targeted learning/development outcomes,
- involves the students from where they are (prior knowledge, interestes, „Who they are"),
- uses interactive, group based settings,
- involves stakeholders for the idea in focus,

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- raises awareness for environmental, social, economic and political problems to stimulate normative and values-based development, and relate them to the SDGs,
- presents SDGs challenges related to your domain as global shared vision,
- uses the three-horizon model to create a shared understanding of the SDGS as common vision (shared foresight),
- fosters a systems perspective based on the three-horizon model as shared vision,
- creates learning activities that are motivating, meaningful, social, experiential,
- takes into account teaching about, for, through sustainable entrepreneurship with a focus on the broad development of the mindset,
- invites students to produce an artefact, something new/innovative that has potential to contribute to sustainable development,
- fosters the development of the six competences proposed by Ploum et al. 2018),
- fosters a reflective practice as accompanying diary and evaluation method
- uses the effectuation model as underlying principle of developing an entrepreneurial self and mindset and controlling uncertainty,
- learns from the feedback of students and the entrepreneurial activities of Alumni, collection of systematic feedback, tracking of sustainable entrepreneurial actions,
- involves role models into teaching.

In short, INTRINSIC' s teaching is motivating, engaging, authentic (takes into consideration the interests of teachers and students), student-centered (there is room for the students' interest, prior knowledge, group formation), social, interactive, immersive (allows emotional experiences and learning), experiential, transformative, is focused on the development of a mindset, requires the development of an artefact, involves stakeholders and role models, introduces the SDGs and related problems and challenges to foster normative reasoning, builds on an effectual logic.

The following recommendations have been developed in collaboration with the teachers at the partner universities/faculties.

**Include one or more workshops on entrepreneurial thinking in existing course**

Special attention to entrepreneurial thinking can also paid by means of an integrated module provided by University's own entrepreneurship team. This is an example from the Wageningen University - in the course Biotechnology II and Case studies Food Quality a workshop was provided followed up with group coaching meetings to support the students in the development of their entrepreneurial mind-set. This was highly appreciated by the teachers, the case owners, and the students. By implementing such module in an existing life sciences course, students more explicitly can develop their competencies for sustainable entrepreneurship.

**Implement group work**

In order to strengthen the cooperation between the students during the execution of their work, collaborative learning, and assignments of specific tasks at groups of students (2 or 3 students in each) can be used. After the group work phase, a presentation of their work is

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followed by questions from their colleagues and by answering to them, the students develop their ability to discuss their arguments.

**Use the Sustainable Canvas Business model for the development of (sustainable) business ideas**

During a course, students can develop specific business ideas using the (Sustainable) Canvas business model, putting attention specifically on the following elements of the model: Product (or business) idea (with elements of innovation / diversification); Identification of potential consumers (market segments) and competitors; Identification of the key partners. The projects are developed individually or in team, presented and discussed with the classmates and the teacher (power point presentation). This project work is part of the final evaluation of the students.

**Involve of stakeholders actively**

This can be done in several ways. In some of the courses, engagement with stakeholders can be established by inviting guest speakers, or the course can be designed in such way students really must interact with the outside world. Students can also work on a case commissioned by a third party (this can be a large organization, but also a start-up). Together with the commissioner students work on the case and are urged to step out of their research minds and go outside of the building to interview and test some of their ideas with all kinds of other stakeholders on a local scale.

**Organize field work**

Using “field work”, students can integrate the theoretical lectures with research activities and practical activities aimed at applying the theoretical knowledge: Analysis, elaboration, and representation of statistical data; Defining consumers’ behavior and characteristics through personal interviews and/or on-line surveys; Analysis of environmental sustainability strategies of the companies (i.e., through websites information, communication strategies adopted, ecological labels and certifications). All these activities are managed individually by students, then collected together and collectively discussed to build further study material, directly produced by the students.

**Work on business case studies**

This activity can be done in groups or individually. It can also be done during a lecture, or as a homework/assignment. The idea is to listen or read a business case study, e.g. from NPR (https://www.npr.org/2020/10/08/921790089/method-adam-lowry-eric-ryan-2018?t=1636625669214). Then, a student writes a case report that localizes, adapts and improves the business in question for a named international market of choice (e.g., "Belgium", "Finland", "North-America"). Student structures her/his answer using the Business Model Canvas, and special focus is put on the adaptation what is needed to happen in the company’s business in order to make the localization into the new area successful. In addition, emphasis on sustainability can be emphasized in the instructions. One idea is to return a presentation-format PDF with one slide for each business model canvas component. This way the cases are all aligned in format, and they are easier to review or peer-review. It is also good

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to put a limit on the length of the answer regarding one component (e.g., 300 words per component works).

**Steer the use of learning diaries**

Students should be invited to write learning diaries thorough the course in order to reflect their learning with their previous work experiences and/or academic references. In addition, it is a good idea to include some sustainability focus by giving the students some examples of good references.

**Keep contact with Alumni**

During the project it became evident, that Life Science universities should take joint effort to track successful innovations developed and implemented by Life Science university Alumni. That is why, the INTRINSIC Sustainable Entrepreneurship Action Tracking Tool was added to the INTRINSIC teaching model, to collect successful sustainability innovations of Alumni in a database that will grow over time and provide role models and cases for further inspiring Life Science students for sustainable entrepreneurship.

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