*Viewpoint*

# Entrepreneurship Education Challenges for Green Transformation

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**Abstract:** Associated with global climate agreements and the European Union's focus on climate-neutral goals by 2050, the development of Green Transformation competencies in society has become topical. This viewpoint paper proposes a conceptual model for applying Entrepreneurship Education (EE) to designing an integrated transdisciplinary, Green Transformation Competence framework. In line with this, EE is seen as a tool for developing an active, informed, responsible, yet sustainable, living ecosystem-oriented and green orientation of citizens in the education system. Nevertheless, this viewpoint recognises several challenges for further research.

**Keywords:** entrepreneurship education; green transformation; sustainability; multidisciplinary; transdisciplinary; competence framework; conceptual model

## 1. Introduction

Global warming is generally recognised as a widespread environmental and societal challenge. The United Nations Sustainable Development Goals (SDGs) define global priorities up to 2030 (UN (United Nations) 2015), addressing the environmental challenges faced by communities. This is the driving force behind the global climate agreements by the United Nations (UN) and the goals for the European Union (EU) to reach climate-neutrality by 2050 (EC (European Commission) 2018, 2019). With this in mind, governments' active and pro-active role in meeting the challenges of restructuring an environmentally sustainable living ecosystem and economy (generally referred to as green transformation) has become increasingly important (Altenburg and Pegels 2012). This does not only mean changing industrial and consumer policy (Polzin 2017; Altenburg and Pegels 2012) but raising public awareness of the challenges and hence reflecting on the role of education. This challenge has found widespread social response among young people, such as when 15-year-old Greta Thunberg launched a school strike for attention to future climate concerns in August 2018. It also has become the Fridays for Future (2021) movement to force governments to be more active in climate change mitigation.

The sustainability issues, climate change mitigation, and concerns for the environment have been viewed both as a challenge and an area of opportunity for public and private institutions. In this regard, universities within the education system have responded by adapting their processes to the SDGs (Fleacă et al. 2018), while businesses are seeing socially responsible policies as an opportunity to be competitive (Vilanova et al. 2009). This challenge has also become part of sustainable (and social) development, as well as eco-entrepreneurship (e.g., Matzembacher et al. 2019; Moon 2018; Mars and Lounsbury 2009) and social entrepreneurship (Pache and Chowdhury 2012; Corner and Marcus 2010). As such, it may probably require the development of new competencies to complement entrepreneurial business skills.

The European Commission (EC) and Organisation for Economic Co-operation and Development (OECD 2005) have formulated several competencies (please read about the

use of the term competence in Appendix A), the possession of which are seen as prerequisites for handling societal challenges, including green transformation. These competencies emphasise the importance of behavioural and attitudinal aspects in civil society and generalised approaches to develop the necessary competencies, such as those put forward by DeSeCo, EntreComp, DigComp, LifeComp, Green, and 21st-century skills. Unfortunately, the development of these competencies in different areas is not interrelated. There has been a significant number of articles published on sustainable and green entrepreneurship, as well as related competencies (e.g., see reviews: Rashid 2019; Gast et al. 2017). Yet competencies for green transformation are poorly addressed, even though the EC calls for the European Competence Framework to be developed to meet the Green Transformation needs (EC (European Commission) 2019). Furthermore, such articles, individually, do not meet the needs of green transition as a complex and integral competence.

The role of education in shaping sustainable thinking has become self-evident (e.g., Richter-Beuschel and Bögeholz 2020; Williams et al. 2017, among many others). Therefore, the question arises as to how to enable the modern citizen's competencies in their multiplicity for promoting sustainability issues. Social and civic (citizen) competences are defined by the European Parliament and Council as one of eight Reference Framework key competence areas, which include social participation and civic responsibility among others (EP (The European Parliament and the Council of the European Union) 2006). (Re, measurement of these, see (Hoskins et al. 2008).) In the context of contemporary citizen competencies, the 'wicked' issues of sustainability, including green transformation, are likely to become a transdisciplinary rather than a disciplinary or interdisciplinary issue. Transdisciplinarity is seen as "a research approach that includes multiple scientific disciplines (interdisciplinarity) focusing on shared problems and the active input of practitioners from outside academia" (Brandt et al. 2013, p. 1). Such issues can be expected to interlink both the natural world and technical competencies with those in the educational arena, e.g., disciplinary and crosscutting (NRC (National Research Council) 2012). Within this, socio-scientific competencies relate to a range of the so-called soft skills, as well as civic values (Holbrook and Rannikmäe 2014). This suggests that, alongside environmental and sustainability awareness within general education, there is an expected need for students to acquire 'citizenship' competencies and even those which involve a more collected realisation, such as those associated with citizenry (Chowdhury et al. 2020). Unfortunately, the development of the range of competencies relevant to Green Transformation, above and beyond University-level research studies, and especially in the development of a citizen, or the collective citizenry, have hardly been an area of study.

Fiore et al. (2019) have attempted to study collaboration between multidisciplinary student teams by measuring competencies before and after an entrepreneurship course. Their findings indicate a slightly positive change in participants' assessments. Also examined are the development of a sustainable mindset within entrepreneurship programmes, these not seen to be at odds with the profit orientation of potential entrepreneurs (Lourenço et al. 2012). Unfortunately, no research is seen as determining the synchronicity of the co-development of entrepreneurial and transdisciplinary green competencies—seeking to determine in which combination and pedagogical form the development of these competencies are most effective.

It is suggested here that education contribution to green awareness, as is envisaged above, is not enough. As has been considered a feature of an active citizen (Hoskins et al. 2008), the participation in social processes is criticized (Biesta 2009) as being insufficiently ambitious. The future citizen needs to gain the competence and the willingness to implement principles of sustainability in an effective way and seek ways of intervention where these are being implemented.

Besides the thrust for promoting analytical, evaluative, and creative abilities (Anderson and Krathwohl 2001), Entrepreneurship Education (EE) is also seen as a potential means for furthering active citizens for sustainability. This idea is supported by the conceptual views of school education development (Shu et al. 2020; Lindner 2018;

Strachan 2018), and EE is actual put forward as a school subject in many countries in Europe (e.g., Johansen and Schanke 2013; Seikkula-Leino et al. 2010).

This viewpoint paper goes further and proposes a conceptual model related to EE's implementation to promote a transdisciplinary Green Transformation Competence framework. It also seeks to open up the challenges for refocusing on EE's role in shaping Green Transformation and Citizen competencies. Moving towards this goal requires interdisciplinary methods, such as design thinking and a systems approach for the interrelating and harmonization of different subjects or thematic competencies (Arnold and Wade 2015). Of course, this also includes making sense of EE in terms of the competencies involved in Green Transformation.

## 2. Green Transformation—Trans- and Multidisciplinary Competence

### 2.1. Conceptual Model

Green Transformation—the term Green Transition is also used (EC (European Commission) 2019) in all spheres of society. Consequently, the corresponding competence development means a transformation, seeking a transdisciplinary involvement of all fields of scientific and social existence. It transcends and connects all areas. Furthermore, the Green Transition process is declared as being supported by a Digital Transformation—the twin challenge in these two areas is emphasized by the EC (EC (European Commission) 2019). With this in mind, an awareness model is now presented, in brief, for the field of competencies, within which it is envisaged a Green TransformationCompetence Framework can be based (the Awareness Field in Figure 1). In comparing the terms 'green competence' and 'green transformation competence', the latter by including the word 'transformation' relates to competence of the process (Cambridge Dictionary 2021), i.e., dynamics.
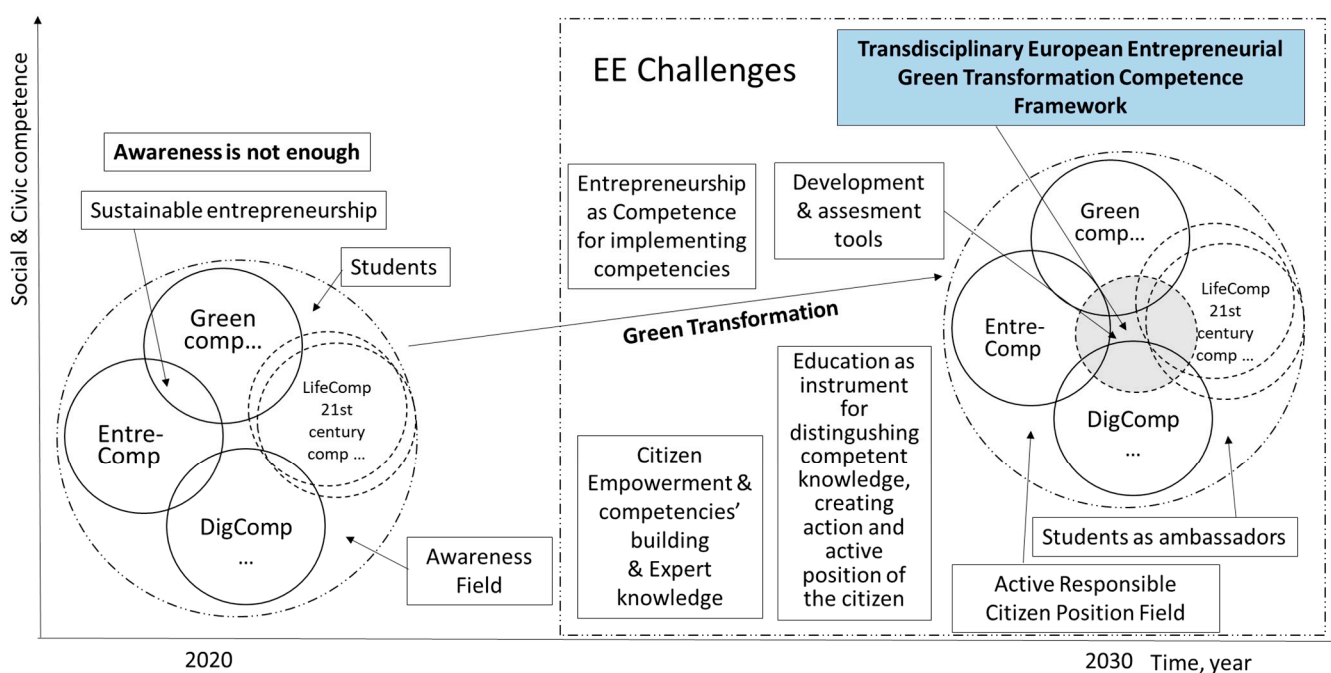


**Figure 1.** Conceptual model of dynamic change of citizen competence framework towards sustainability action and lifestyle through Entrepreneurship Education (EE).

Several competence models and recommendations have been developed, of which the most important Green, Digital and Entrepreneurship (EntreComp in Figure 1) skills in the context of the paper, are highlighted separately. Other coherent skills are seen as included within the more general 21st-century competencies (circles with dashed lines, noting not all competencies mentioned above are listed). The whole competence field of awareness is seen as transforming into a field of Active Responsible Citizen Position, proposed by

2030, due to EE intervention. The process is dynamic—involving social acceptance and, at the same time, the competencies of the citizen changing over time, in recognition that the development of social and societal processes takes decades. With this in mind, it is recognised that achieving the EU's Green Transformation goal of climate neutrality by 2050 requires that the relevant competencies be developed by a 2030 deadline.

The main challenges for an EE intervention in this process are seen as:

(1)   Moving from Green Competence to develop Green Transformation (as a process-centred) Competence (Framework), and thereby

(2)   Raising citizen/civic competence to a new entrepreneurial active level.

The range of competencies in the model (Figure 1) originates from the reference framework's eight key areas (EP (The European Parliament and the Council of the European Union) 2006). These are developed further within specific single competence frameworks, some of which and emerging related issues are introduced in the following subsections.

### 2.2. EntreComp

This framework for entrepreneurship competencies is developed by a Joint Research Centre (JRC) in the EC (Bacigalupo et al. 2016). It focuses on three areas: Ideas and Opportunities, Resources and Action-related, competences, each of which consists of five specific competencies. These include, but are not limited to, recognising opportunities, creativity, evaluating ideas, personal qualities (self-awareness, motivation, financial literacy) and developing the ability to take the initiative, undertake planning, and promote teamwork and collaborative learning. A complete list of EntreComp competencies is presented in Table 1 (left column), given together with Green Competences (ILO (International Labour Office) 2019).

**Table 1.** Entrepreneurship (EntreComp) and Green Competences.

| EntreComp Competences | Overlapping Competences | Green Competences |
|---|---|---|
| **1. Ideas and Opportunities** | | **Required across the labour force** |
| 1.1. Spotting opportunities | Identifying opportunities | Environmental awareness and respect; willingness to learn about sustainable development |
| 1.2. Creativity | | Adaptability and transferability skills to enable workers to learn and apply the new technologies and processes required to 'green' their jobs |
| 1.3. Vision | | Teamwork skills, reflecting the need for organizations to work collectively on tackling their environmental footprint |
| 1.4. Valuing ideas | Responding green challenges | Resilience, to see through the changes required |
| 1.5. Ethical and sustainable thinking | Environmental awareness and respect; sustainability attitude | Communication and negotiation skills to promote required change to colleagues and customers |
| **2. Resources** | | Entrepreneurial skills to seize the opportunities of low-carbon technologies and environmental mitigation and adaptation |
| 2.1. Self-awareness and self-efficacy | | **Required in medium to high-skilled occupations** |
| 2.2. Motivation and perseverance | Resilience | Analytical thinking (including risk and systems analysis) to interpret and understand the need for change and the measures required |

**Table 1.** *Cont.*

| | | |
|---|---|---|
| 2.3. Mobilizing resources<br>2.4. Financial and economic literacy | | Coordination, management, and business skills that can encompass holistic and interdisciplinary approaches incorporating economic, social, and ecological objectives |
| 2.5. Mobilizing others | Communication, negotiation | Innovation skills to identify opportunities and create new strategies to respond to green challenges |
| **3. Into action** | | Marketing skills to promote greener products and services |
| 3.1. Taking the initiative | | Consulting skills, to advise consumers about green solutions and to spread the use of green technologies |
| 3.2. Planning and management | Strategy and leadership, coordination | Networking, IT, and language skills to perform in global markets |
| 3.3. Coping with uncertainty, ambiguity, and risk | | Strategic and leadership skills to enable policy-makers and business executives to set the right incentives and create conditions conducive to cleaner production and cleaner transportation |
| 3.4. Working with others | Teamwork, networking | |
| 3.5. Learning through experience | Adaptability & Transferable skills | |

Source: Authors' compilation combining ILO 2019 and Bacigalupo et al. 2016. Competences are grouped as if they were the original source.

While most empirical studies focus on a single or entire set of competencies (e.g., Gümüsay and Bohné 2018; Nabi et al. 2018; Jie and Harms 2017; Rasmussen et al. 2011), none cover as wide a range of competencies as EntreComp; although the EntreComp framework has been agreed by a group of experts and has been published (Bacigalupo et al. 2016), it has not been empirically proven by the JRC. Nevertheless, it needs to be noted that the coverage of competencies by EntreComp is also not claimed to be complete. A similar but somewhat more systematic framework has been developed in Estonia and has been tested on more than 1400 students, but the study is ongoing (Venesaar et al. 2018).

In addition, while entrepreneurship has been considered a process phenomenon (Davidsson 2008), EntreComp does not define the entrepreneurial process's competence. This allows opportunities to be envisaged for developing a competence framework in the context of both entrepreneurship and green transformation. Linking these process phenomena can also be the task of the EE.

### 2.3. DigComp

This is a Digital Competence Framework for Citizens created by the EC JRC (Vuorikari et al. 2016), in which five competence areas are included: information and data literacy, communication and collaboration, digital content creation, Safety, and problem-solving.

### 2.4. LifeComp

This is a framework (also like DigComp created in JRC) within the European Framework for Key Competences, involving Personal, Social, and 'Learning to Learn' attributes (Sala et al. 2020; Caena 2019). It includes sub-competencies of Self-regulation and Flexibility, Empathy, Communication and Collaboration, Critical thinking, and Managing learning, among others. All these are divided into the purposeful acquisition of skills.

### 2.5. 21st Century Skills

These skills move learning away from being solely subject cognitive learning and seek to meet broader educational needs associated with lifelong learning, the world of work and greater social interactions. Initiated by the OECD (2005) via defining and selecting three key competence areas, the DeSeCo group identified these as—the need to act autonomously, use tools interactively, and function in social heterogeneous groups. Alterna-

tively, Ananiadou and Claro (2009) discuss three dimensions: information, communication and ethics, and social impact. Among such skills are included creativity, critical thinking, problem-solving, decision-making, digital literacy (digital citizenship), and environmental responsibility.

### 2.6. Education 2030

Educational challenges, included in the future of education and skills, Education 2030 (OECD 2018), are seen as environmental, economic, and social. A proposed associated learning framework is seen as the need to encompass disciplinary ideas, crosscutting concepts, and social-economic practices. This is seen as forming the base for developing, so-called, 21st-century competencies associated with knowledge acquisition (whether disciplinary, interdisciplinary, epistemic or procedural), skills (cognitive and meta-cognitive, social and emotional, physical and practical), and dispositions (attitudes and values) at a personal, local, societal and global level. This framework leads to a vision for creating new values, taking responsibility, and reconciling tensions and dilemmas (OECD 2018). Furthermore, the institute for the future (University of Phoenix Research Institute 2011) sees future work skills in 10 key areas—sense-making, social intelligence, novel, and adaptive thinking, cross-cultural competency, computational thinking, new media literacy, transdisciplinarity, design mindset (incorporating planning), cognitive load management, and virtual collaboration.

### 2.7. Transdisciplinary Considerations

Climate change, green skills (ILO (International Labour Office) 2019; OECD 2014), and sustainability competence, including sustainable entrepreneurship, have developed rapidly over the last decade. These include inter alia, sustainability at the societal level, environmental sustainability, protection of natural diversity and the promotion of related education (Lozano et al. 2017), and developing students' sustainability competencies in a broader sense (Scherak and Rieckmann 2020; De Haan 2010). Applications of these competencies range from technology development and energy production (a zero-energy concept in construction, solar energy consumption), transport, mechanical engineering, packaging industry, the fashion industry—to virtually all walks of life (EC (European Commission) 2019). Furthermore, carbon footprint assessment has become a measure of societal sustainability and its awareness. As such, the concept of sustainability and green transformation is truly transdisciplinary (Bernstein 2015).

### 2.8. Competence Frameworks

Attempts to design education for sustainable development (ESD) at the university level have shown that making choices within a large variety of competence models is difficult (Wilhelm et al. 2019). In conditions where different criteria are used to classify and group competencies (cognitive, behavioural, sectoral-professional, disciplinary, the list is not exhaustive), comparing competence frameworks is a real challenge. One such example is the comparison of Entrepreneurship and Green Competencies (Table 1). Of potential concern is that the sources of competence frameworks often guide the development of national strategies. It is therefore worthy to note that according to the International Labour Office (ILO (International Labour Office) 2019), there are green technology competencies and personal competencies among green skills that are not represented (explicitly) in EntreComp, such as 'consulting' or 'analytical thinking' and 'interdisciplinary thinking'. Furthermore, the competence frameworks, using different generalization levels, are very different from each other. This becomes an example of barriers to identifying common ground of competences and developing a comprehensive Green Transformation competence framework.

*2.9. Citizen Science*

Whereas originally, the term 'citizen science' is applied to amateurs' contributions to science (e.g., Foth 2018), today, the scientific worldview is taking on a broader meaning. Citizen science acquires a special significance in modern post-truth society (Farrow and Moe 2019). The citizen requires both scientific skills and expert knowledge to orientate within the landscape of social media, conscious disinformation, and populist politics. The educational instruments empower the citizen to distinguish and value truth information and use this responsibly and actively (Figure 1: Expert knowledge; distinguishing competent knowledge).

*2.10. Transdisciplinary Green Transformation Competence Framework*

As shown from the brief overview above, the sectoral frameworks largely contain subsets of skills or competencies. Such skills and/or competencies relating to aspects of content, operational skills, and dispositions, interact and even overlap (e.g., Table 1). Such an overlap creates the preconditions for integrating these frameworks into the Transdisciplinary Green Transformation Competence Framework. This presupposes the integration of different competence frameworks and the development of corresponding educational concepts at different education levels. The EE has a central role, and the resulting goal is envisaged as per the Transdisciplinary European Entrepreneurial Green Transformation Competence Framework (Figure 1).

## 3. Revisiting Entrepreneurship Competence for Green Transformation

EntreComp (Bacigalupo et al. 2016) defines entrepreneurship in its so-called 'broad meaning' applicable to all spheres of life, both in commerce and in other activities in society, individually, and in an organisation. Davidsson (2016), and without denying other options, considers creating a new economic activity to be entrepreneurship. Gartner (1990) sees the outputs of entrepreneurship not only in classical business but also in a non-profit organisation, in the governance structure, and within the existing organisation. Despite the differences in entrepreneurship concepts, none of these approaches provide an answer to how entrepreneurship needs to be taught. However, the answer to this question becomes important if one wishes to formulate the form in which entrepreneurship is taught to specific target groups—in the so-called 'broad' or 'narrow' sense. This also raises the question of whether the education system should teach entrepreneurialism (entrepreneurial behaviour and culture), i.e., entrepreneurship in a 'broader' meaning. It is also worthy to note that sometimes the kind of training that develops both entrepreneurship in venture creation and personal entrepreneurial development is referred to as entrepreneurial education (Hägg and Gabrielsson 2019).

Entrepreneurship is seen as an expression of a volitional act (Krueger et al. 2000). Volition is a quality (competence) prerequisite for taking an active position by a citizen in green transformation. However, an active position depends on the attitude that develops before entering university (Mets et al. 2017; Venesaar et al. 2011). Questionnaire measurements have also found a positive effect of entrepreneurship training on entrepreneurial intentions (Küttim et al. 2014). Less research has been undertaken on the development of conative learning outcomes (Kyrö et al. 2011). There is no unequivocal awareness of the connections between all skills and the age at which young people develop these competencies. It is also not clear as to the more effective, age-appropriate methodological and content approaches to teaching and learning within the lifelong learning context. Furthermore, the importance of awareness and skills, but an active behavioural pattern for applying these skills, has been recognised (Cabral and Dhar 2019). This also means exploring how intentional and conative qualities develop the shaping of patterns of actual behaviour in any field of competence, i.e., understanding how to develop the competence enabling the implementation of competencies, even though it is not clear, as yet, how to achieve active (entrepreneurial) behaviours and attitudes.

It is proposed that entrepreneurship and entrepreneurial skills alone are not enough to integrate the Green Competence Framework into a functioning green transition system.

Introducing change in the man-made environment for implementing entrepreneurship skills requires sustainability-oriented creativity and innovation in both social and technological terms (Lackéus et al. 2020; Shu et al. 2020; ILO (International Labour Office) 2019). A good example of mobilizing society in green innovation processes is the EIT Climate-KIC, a Knowledge and Innovation Community (KIC), supported by the European Institute of Innovation and Technology. KIC combines the training of a new generation of entrepreneurs with 'innovative working to accelerate the transition to a zero-carbon, climate-resilient society' (EIT Climate-KIC 2021).

Developing an entrepreneurial attitude and volitional qualities in citizens are seen as key issues in integrating different competencies into the Transdisciplinary Green Transformation Competence framework. The development of EE, leading to the integration of a wide range of competencies, is little researched in this context. Wheeler-Bell (2014) sees teaching social entrepreneurship at school as nurturing an active citizen to achieve radical social transformation. Lindner (2019) introduces this approach as the 'TRIO Model of Entrepreneurship Education', including 'Core Entrepreneurial Education', 'Entrepreneurial Culture' and 'Entrepreneurial Civic Education'. Nevertheless, in offering such a model, it is important to recognise the need to put forward different approaches to EE. This can be the key to teaching entrepreneurship at different school levels.

Understanding EE's role in shaping a citizen's sustainable, environmentally active attitude is still in its infancy (Lindner 2019). The EE methodology itself is still evolving. This is partly due to EE's introduction through the so-called top-down principle—it started with higher education and then continued towards lower secondary and basic education levels. So far, the impression given is that there is more practice than scientifically based knowledge of the most effective methods, from the point of view of society, in accordance with the student's age and level of education. Therefore, implementing EE in front of a 'wheelchair appreciation' of green skills and citizenship is a complex task.

In comparing EntreComp and Green Skills (Table 1), the competence systems are built on very different principles, with relatively modest overlap. Although, e.g., ethics and sustainability are included within both these competence frameworks (Table 1), their integration needs to be considered with care. The situation is further complicated by trying to reconcile them with, for example, the framework of sustainability competencies for education purposes (Scherak and Rieckmann 2020; De Haan 2010). Given the multiplicity of entrepreneurial competencies in research publications (Reis et al. 2020), it can be concluded that exploring the links between entrepreneurship and green transformation competencies is a serious scientific challenge.

## 4. The Way Forward

### 4.1. Priorities for EE

As a brief introduction to the role of EE in promoting Green Transformation competencies within society, the following hypothesis is proposed:

> *The application of the educational values, attitudes, knowledge, and skills, based on society oriented, green transformation competence models, requires age-appropriate, responsible, educationally effective, pedagogical applications of content and context-relevant entrepreneurial and transdisciplinary approaches to lifelong learning.*

In order to follow this hypothesis, a way forward is needed to guide both EE practitioners and researchers. Although entrepreneurial competence includes sustainability and green competence elements, its conceptualisation is not aligned with green transformation goals, and climate change and curricula need to be complemented by incorporating green competencies. A good example here is the inclusion of the already existing specialised entrepreneurship subject, technology entrepreneurship. As mastery of different green technologies (ILO (International Labour Office) 2019) is essential, technology entrepreneurship, when supplemented accordingly, is well suited for this purpose (e.g., Duening et al. 2015). Unfortunately, this approach does not answer the main issue—the development of green transformation competence as the key for developing a responsible entrepreneurial citi-

zen. Such a task for EE requires the renewal or even innovation for existing competence models at school. At present, it is not entirely clear how, or through which school level of entrepreneurship study course, it is appropriate to offer the most effective impact on a young person's intentional and attitudinal qualities and other learning outcomes. Such a study would mean pre- and post-test assessments (see, e.g., Sánchez 2013) at all education levels.

The priority issue is synchronising, structuring, and streamlining the frameworks for entrepreneurship, sustainability, and green competencies to identify transferable and interrelated, and compatible competencies. A special group of competencies needs to be formed for the Green Transformation, which relates to recognizing and implementing the necessary changes. These are learning areas within different disciplines for which little is known about student's receptivity. Consideration needs to be given to developing these competencies together or separately and in what proportion between disciplines.

*4.2. Addressing the Challenges*

Based on the above overview and discussion, challenges are seen, particularly, but not limited to, EE and research. Furthermore, a multi- and transdisciplinary approach extends the challenge to the whole field of green competencies. Although some challenges have been addressed to a greater or lesser extent in entrepreneurship and EE studies, the list is certainly not exhaustive. However, the question of the extent to which these themes are consistent with other disciplines remains, as there are still no exhaustive answers to that which is needed for preparing future studies. Research into the competencies to promote the role of education in the formation of the citizen as an entrepreneurial active 'hero' of the Green Transformation still lies ahead.

Some proposed tasks and challenges for EE and research are suggested as:

1. Synchronising, structuration, and streamlining existing competence frameworks into an Entrepreneurial Green Transformation Competence Framework of the European citizen.
2. Integrating holistically Entrepreneurial Green Transformation competencies into the education system/curricula to meet future climate challenges by active, skilled citizens.
3. Treating entrepreneurship as a tool for promoting citizen in the education system.
4. Teaching entrepreneurship's effectiveness in a 'narrow' and' broad' manner depends on the learner's age and school level.
5. Replacing a green competencies framework by an entrepreneurial dynamic green transformation competencies model.
6. Entrepreneurship as a competence becoming an enabler of the development and implementation of Green Transformation (process) competencies by citizens.

The latter statement includes several other links that are seen in need of investigation and are empirically proven. These are based on the premise that entrepreneurship is the main discipline that explores/develops a person's intentional (volitional) and motivational qualities. Co-developing entrepreneurial capacity and green transformation competencies can have a significant mutually positive effect at both an individual and a societal level. Furthermore, implementation of the entrepreneurial and transdisciplinary approaches can facilitate and mediate the role in these correlations. The testing and seeking of answers to the proposed challenges and still to be created hypotheses comes through researchers' collaboration between education and pedagogy of entrepreneurship and different sciences.

**5. Conclusions**

The development of a Green Transformation competencies framework, led by EE, means the continued application of design thinking and a systemic approach in the strategy of further research. The process's output is expected to be the development and assessment tools for recognising transdisciplinary Green Transformation Competence and its potentially diverse framework. In addition, students equipped with such competence are seen

as becoming ambassadors of Green Transformation competence in society (see also Figure 1). In this way, the competence developed through EE becomes an instrument that enables the application of the Green Transformation Competences Framework as a whole. It also implies that the field of green awareness becomes a field promoting responsible action and active citizenry. EE has the opportunity to contribute to this process.

It is appropriate to conclude that entrepreneurship, as a competence, can be expected to play an important role in the active implementation of the Green Transformation. EE's role in developing the necessary competencies in different subject and age contexts has been little explored. It is also not clear how far the competencies to be integrated into the Green Transformation competence need to be co-developed. To date, only initial challenges for transdisciplinary educational interventions, based mainly on EE practices and research, can be formulated.

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**Appendix A**

To distinguish between the concepts of competence, competency(ies), and skills, we proceed from the definition that the latter primarily defines the ability to perform a specific task (Bird and Schjoedt 2009). These three terms are partly used interchangeably in the literature or different versions, and they denote the same thing by different terms. Here we use the term competency, primarily in the plural, to denote different abilities (skills) together. In terms of the cognitive, affective, and skill-based perspectives of the three groups of learning outcomes (according to Bloom's taxonomy—Bloom et al. 1956), competence would refer primarily to the group, or generalized level—singular, and for groups or in generalized meaning—plural. The distinction is not strict—we try not to conflict with the context of the sources cited.

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