DECODE Sustainability

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# Embedding sustainability in academia: Deans as change makers

## Literature Review

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## DECODE: EUROPEAN DEANS COUNCIL FOR SUSTAINABLE DEVELOPMENT

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# I. SUSTAINABILITY IN HIGHER EDUCATION

## 1.1 Introduction

Sustainability and sustainable development are emerging as important policy priorities in higher education (Global University Network for Innovation, 2017). This reflects growing pressures on higher education institutions (HEIs) to demonstrate how they address the sustainability challenges that societies, industries and economies are facing – challenges around achieving a more inclusive, sustainable society. HEIs are increasingly expected to think about how and what they teach, how they encourage students to become entrepreneurial and engaged citizens, and what research their academic staff carry out to promote sustainable development.

These developments will require universities to commit to sustainable development throughout their entire institution. This requires more than a central university strategy alone. All academic units (i.e., faculties, schools, departments) belonging to the university, their deans and their representatives will have to be engaged. And deans will have to act as pro-active change makers. Embedding sustainable development in all their academics will allow HEIs to better address the challenges around economic, social and environmental sustainability.

In this report, we will be focusing on heads of departments, faculties and schools – in short: *deans*. Deans, as leaders of academic units, are responsible for overlooking, managing and encouraging sustainability initiatives in their academic unit.

A commitment to promote sustainability goes further than providing merely transactional services to society. Instead, it is about truly transformational activities. Transactional services typically imply that universities strive to provide their students with relevant labour market skills and that academics are engaging with businesses in R&D cooperation and knowledge transfer. These topics are often covered in the literature on academic entrepreneurship and knowledge transfer (Etzkowitz et al., 2008; Guerrero et al., 2016). However, transformational activities are about longer-term issues; transformational activities focus on sustainable development needs. They deal with the issue of how higher education institutions can contribute to sustainable socio-economic development (Global University Network for Innovation, 2017; Goddard et al., 2013). For such transformations commitment both at the central level and academic-unit level is required.

It is this commitment to sustainability and SDGs that is also firmly underlying the current European Commission's transformation agenda for higher education (European Commission, 2020a). This revised European growth agenda is more than creating jobs and boosting economic growth, but extends to contributing to ecological, social and economic sustainability. In other words, higher education is considered a pre-requisite in the advancement of sustainability, due to its mandate of creating knowledge (i.e. expertise, research, technology) and delivering skilled graduates and inspirational leaders who possess the competences and vision to foster change (Cheeseman et al., 2019; European Commission, 2019a) .

In this literature review we present our current knowledge about the strategies, policies and efforts undertaken by HEIs to embed sustainability and attention for sustainable development (SD) in their education, their research, and their societal engagement activities – the three missions of HEIs. Our leading question is:

*How do HEIs institutionalise sustainability and sustainable development at the departmental level?*

Our focus is the middle management of HEIs: deans and their representatives, department heads, academic directors, and programme leaders. These middle managers are regarded as the driving force pushing initiatives such as SD – they are the *change-makers*. To make that change, deans will have to possess the relevant skills and tools to integrate SD in their academic unit's education, research and societal engagement portfolio.

The literature review is conducted as the first output of the DECODE project (https://decode-council.org/) that aims to build a European Deans Council for Sustainable Development. DECODE is funded through Erasmus+, Key Action 2, Cooperation for innovation and the exchange of good practices. The project takes place from September 2020 to August 2023 for a total of 3 years. At the first stage, the DECODE project aims to identify obstacles commonly faced by deans and academics. It will also identify some good practices of HEIs pursuing sustainability initiatives at their academic units. During the project, these insights will be used to empower and support deans on their journey to transform their academic units to embrace sustainable development principles throughout teaching, research and societal engagement activities.

The DECODE project is born out of a belief that deans are able to drive such change, yet often encounter common obstacles. These include: a lack of consensus on what sustainability means, a departmental culture that does not prioritise sustainability over other academic values, a lack of resources and capacity to take actions such as the transformation of curricula and the related pedagogical models, or a lack of resources and capacity to steer the research agenda towards more multidisciplinary sustainability-related themes. This literature review

will discuss how deans may tackle these challenges when embedding sustainability in their academic units.

Before presenting our insights from the literature on the challenges and tools around embedding sustainability in academic departments, we will first describe some of the global policies and trends around sustainability to provide some context.

## 1.2 Sustainability in higher education

In 2015 the United Nations (UN) proposed its 2030 Agenda for Sustainable Development. The agenda specified seventeen interlinked Sustainable Development Goals, or SDGs (United Nations, 2015b). The SDGs balance the three dimensions of sustainable development: economic, social, and environmental. Almost 200 countries subscribed to the SDGs, agreeing to collectively work on this blueprint to build a better and more sustainable future for all. Since then, the terms *sustainability* and *sustainable development* have gained considerable attention on a global scale. Stakeholders in various sectors, including higher education, have committed to contribute towards the attainment of the SDGs (McCowan, 2019).

Yet sustainable development is not a new policy priority. Already in 1987 the famous report by Brundtland et al. - 'Our common future' – had made an urgent call 'to propose long-term environmental strategies for achieving sustainable development by the year 2000 and beyond' (Brundtland et al., 1987). Despite this call, at the end of the 20th century sustainable development largely remained in the periphery. The 2030 Agenda for Sustainable Development created momentum, as people became more aware of the limitations of the existing ecosystems. Amid increasing concerns about climate change, global health, refugee crises, and growing awareness about social inequalities, the message about sustainable development started to resonate more strongly among countries and citizens. For example, the European Union committed to lead by example, and in November 2016 outlined its strategic approach towards the implementation of the 2030 Agenda and in 2019 it released the *European Green Deal* (European Commission, 2019a, 2020b; Timmermans & Katainen, 2017).

The higher education sector is recognised as one of the major players in advancing sustainability through its research, education and societal engagement. This is demonstrated by a vast and growing literature in the field (Cheeseman et al., 2019; Findler et al., 2019; Kordestani et al., 2015; Rivera & Savage, 2020; Sonetti et al., 2020). Interdisciplinary sustainability research can help to identify priority areas and address global challenges in local context (Salvia et al., 2019) while education offered by HEIs is indispensable to create a sustainability culture. Moreover, the European Commission stresses that sustainability should not only be taught but also actively practiced on green campuses (Timmermans & Katainen,

2017). Finally, HEIs are in a position to mobilise stakeholders and networks through their societal engagement activities, thereby pulling together knowledge and resources (Sonetti et al., 2020) to address sustainable development goals and the underlying challenges.

## 1.3 Structure of this report

In the remainder of this report we will first (in chapter II) present a guiding framework to classify our findings from the literature review. This analytical framework, inspired by policy theory (in particular: Schneider & Ingram, 1990), distinguishes five themes. Each of these themes will be covered in the chapters that follow: Strategy & awareness (chapter III), Monitoring and organizational learning (chapter IV), Capacity building (chapter V), Incentives (chapter VI), and Authority, voluntary actions and student initiatives (chapter VII).

# II. ANALYTICAL FRAMEWORK

## 2.1 Policy tools for addressing sustainability challenges

Higher education institutions (HEIs), their students, academic staff and managers at the various levels of these institutions, are all facing sustainability challenges. However, these internal university stakeholders may not always be equally enthusiastic in advancing sustainable development (SD) in their curricula, their research, or other university and campus activities. There may be several reasons why organisations such as HEIs are not taking the actions needed to address challenges such as the SDGs. Schneider and Ingram (1990) have identified five reasons in their work on policy tools:

1. they may disagree with the values implicit in the means or ends;
2. the situation may involve such high levels of uncertainty that the nature of the problem is not known, and it is unclear what people should do or how they might be motivated;
3. they may lack the capacity to take the actions needed;
4. they may lack incentives;
5. they may believe the law does not direct them or authorize them to take action.

Following Schneider and Ingram, we have identified the following policy tools to address these problems at the academic unit level (see figure 1):

1. **strategy and awareness building**, by using symbolic and encouragement signals to influence perceptions or values;
2. **monitoring and organizational learning**, to increase understanding of an issue or reduce uncertainty about how to address it;
3. **capacity building,** to provide information, training, skills and resources to enable individuals, or groups to make decisions or carry out activities;
4. using **incentives**, i.e. tangible payoffs, positive or negative, to induce compliance or encourage people to do things that they might not have done otherwise;
5. providing **authority**, ranging from **voluntary actions** and permissions, to **regulation** that prohibits or prescribes conduct under designated circumstances.

These five policy tools are helpful for approaching and categorising the academic literature on transformations dealing with the integration of sustainability in academic departments. In the following chapters we will survey this literature, using the five policy levers as the guiding framework and as key themes of this report.

Figure 1: Analytical framework


Adapted from Schneider & Ingram (1990)

While some of the literature we cover will be focusing on the sustainability strategies and policies of HEIs as a whole, we will also try to specifically highlight the role of **deans** as change agents at a departmental level. And while deans may be important change agents, **students** can also be drivers of change in a HEI. Therefore, as part of the fifth group of policy levers, we also pay attention to how HEIs can support and authorize bottom-up **student initiatives** promoting sustainability in higher education – focusing on the often voluntary, extra-curricular activities undertaken by students.

Until now, most sustainability efforts focused on the wider HEI/institutional level, with limited attention paid to faculties, schools, departments, and the role of deans. The Decode project aims to fill this gap. When surveying the five policy levers for facilitating sustainability transformation we will reflect on the major drivers and obstacles that are relevant for deans.

# III. STRATEGY AND AWARENESS

## 3.1 Introduction

Responding to a changing context for higher education where sustainability is much more at the centre requires academic departments to rethink their priorities, formulate a vision and agree on a strategy. Shaping a strategy and building awareness by employing symbolic and encouragement tools may help universities pursue certain goals. However, not everybody in academia may be aware of the newly emerging priorities, or indeed be convinced to take them on board in their work. Deans then may feel they have to make the staff in their department aware of new realities. Deans may start using symbolic signals and provide encouragement to influence the perceptions and values driving the education and research in their academic units. They can point to the new priorities and contexts emerging and the global trends with respect to sustainable development.

Figure 2: Analytical framework – Strategy & Awareness Building

## 3.2 Sustainability strategy in a global context

Many of the goals promoted by the United Nations, the European Commission (EC) and national governments are focusing on fairness, justice and sustainability. In their strategies, HEIs can choose to embrace sustainability and make it an explicit value for their institution – as part of their social responsibility. Giving priority to sustainability in a HEI is a strategic choice. Priorities are very much driven by the central leadership of the institution and addressed in institution-wide policies and strategies at the central level. But they also are found at the level of faculties and departments. The level of commitment by the leadership of an institution that of a department is an important element in institutional strategy making.

When addressing the issue of sustainability within HEIs, it is important to make staff and students in the institution aware of global trends and existing global agendas. Facing these, academic units may then decide to develop specific strategies for their staff and students. This section of the report sheds some light on supranational and regional sustainability agendas formulated by the United Nations and the European Commission: Sustainable Development Goals (SDGs), the European Green Deal and the United Nations' Higher Education Sustainability Initiative.

In the United Nations' Agenda 2030, HEIs were called upon to cooperate in addressing the SDGs. HEIs were urged to reflect on their priorities and mobilise resources to address the global challenges through their teaching, research and third mission activities. Global strategic plans such as *Agenda 2030* are helpful tools to communicate and prioritise societal challenges and highlight potential ways forward for an organisation.

On the same note, the European Commission (EC) has emphasized the critical role of research and education in attaining sustainable EU economy. The EC has proposed that the European education institutions at all levels embrace the SDGs throughout their activities. It suggests that the reforms should not be limited to curriculum development, but also include the development of green campuses. Moreover, the European research community should take the lead in developing and deploying breakthrough solutions for green and inclusive growth (Timmermans & Katainen, 2017). In 2018, a new European-wide initiative was started – European University Initiative – resulting in 41 European University alliances representing more than 280 higher education institutions. One of the key objectives of the alliances is tackling the big issues facing Europe and the world such as climate protection, democracy and health. To attain this objective, students, academics and external stakeholders work together in transdisciplinary and transnational teams (European Commission, 2019b).

In 2019, the EC released *the European Green Deal*, outlining priority actions to achieve European climate targets by 2030 and 2050. Mainstreaming sustainability in all EU policies, including education and research, is seen as an essential next step. A range of instruments under the current Horizon Europe program will be available to support research in the areas of

sustainable solutions while bringing together various stakeholders, including HEIs, industries and citizens. The Commission will support the development of a European competence framework to facilitate creation and assessment of knowledge, skills and attitudes on climate change and sustainable development. Moreover, the European Social Fund will help to equip and up-skill Europe's workforce transition from declining industries to green economy (European Commission, 2019a).

Since the adoption of the 17 SDGs, multiple initiatives have encouraged HEIs to align their efforts with the global goals. One of the initiatives is the SDG Accord. Launched in 2017, the SDG Accord is an international initiative stimulating the higher education sector to demonstrate its commitment to meeting the SDGs. The initiative is endorsed by the UN's Higher Education Sustainability Initiative (HESI). In 2020, 178 institutions across five continents had signed the SDG Accord. Signatory institutions are required to align all major efforts with the Sustainable Development Goals, through education, research, leadership, operational and engagement activities. In addition, institutions annually report on their progress towards SDGs and commit to share good practices and collaborate with diverse stakeholder groups. The findings from the SDG Accord progress report (2020) indicate that awareness of the SDGs amongst HEIs worldwide is steadily increasing. Moreover, the number of institutions committing to SDG Accord also continues to grow (The SDG Accord, 2020).

One of the first steps that HEIs and academic units can take towards becoming more sustainable is incorporating sustainability in their institutional and academic units' strategies. Ideally, the central sustainability strategy should be co-created utilising both top-down and bottom-up approaches and involving a multitude of external stakeholders while academic units actively participate in tailoring the strategy to their needs. This, in the belief that a successful sustainability strategy needs to be recognised and embraced by students and staff and throughout various academic units, not only by the central leadership. Deans can play an important role in bringing sustainability strategy closer to their academic unit's specific needs.

Moreover, awareness building activities are of high importance for embedding the strategy within the institution and its academic units. Lack of awareness from both students and staff was one of the key barriers in advancing SDG-related initiatives identified by the SDG Accord signatories. The biggest benefit of aligning institutional efforts with SDGs was that it created a space for clear and relatable dialogue on sustainability issues within the institution (The SDG Accord, 2020). Also in awareness-building activities deans can play an active role in clearly communicating sustainability values and engaging staff and students in co-creating an academic unit's strategy.

## 3.3 Sustainability in education strategy

Education has a critical role in promoting sustainability. Education for Sustainable Development (ESD), developed and endorsed by the UN, is highlighted as one of the most promising approaches to promote sustainable development in the field of education. First institutionalised in 1992, it is recognised in the Paris Agreement (2016) and incorporated in the Agenda 2030 Sustainable Development Goals (UNESCO, 2017). Target 4.7 under SDG4 (Quality Education) states that governments should ensure that 'all learners acquire knowledge and skills needed to promote sustainable development, including among others through education for sustainable development […]' (United Nations, 2015a). In addition, the Council of the European Union, reflecting on the key competences for lifelong learning, has recommended all member states to 'mainstream the ambitions of the UN Sustainable Development Goals, in particular within the SDG4.7, into education, training and learning, including by fostering the acquisition of knowledge about limiting the multifaceted nature of climate change and using natural resources in a sustainable way' (Council of the European Union, 2018, p. 5).

ESD is holistic and transformational education, addressing not only learning content, but also pedagogy, outcomes, and learning environment. The ESD approach enables learners to take informed decisions and responsible actions for environmental integrity, economic viability and a just society for present and future generations. After its inception in 1992, ESD gained further recognition during the UN Decade on Education for Sustainable Development (DESD, 2005 - 2014) and the Global Action Programme on ESD (GAP, 2014-2019) (UNESCO, 2017). The new program, *ESD for 2030* is a global framework for implementation of ESD for the period 2020-2030, emphasising the role of education in contributing to the attainment of SDGs. It outlines five priority areas: advancing policy, transforming learning environments, building capacities of educators, empowering and mobilising youth, and accelerating local level actions. In order to implement the changes effectively, the ESD for 2030 roadmap stresses the need to conduct communication, outreach and advocacy activities for diverse and broad stakeholder groups (UNESCO, 2020).

Setting ESD as a priority will require numerous changes at the institutional and academic unit level, including curriculum redesign, capacity building for educators on transformational teaching pedagogies, building learning environments more connected to external communities, and a strong focus on ESD competences. Many of these aspects are addressed in the section on capacity building further on in this report. ESD, however, is not the only learning approach tackling sustainability challenges. Other approaches used by institutions are challenge-based learning, service-based learning and project-based learning, which also incorporate aspects of ESD. For example, the ECIU University, the alliance set up by the European Consortium of Innovative Universities as part of the European Universities Initiative, consists of 12 universities from across Europe. It aims to offer challenge-based education,

research and innovation, integrating the needs of society, research and industry, and focusing on complex, multidisciplinary challenges (ECIU University, n.d.), many of them related to the challenges posed by the SDGs

## 3.4 Sustainability in research strategy

Multidisciplinary, challenge-oriented research can substantially contribute towards addressing global issues by analysing scenarios and identifying priorities and obstacles. An increasing number of publications analyse the most popular areas of research linked to SDGs, identifying both the gaps and strengths in SDG research and geographical coverage (Asatani et al., 2020; Olawumi & Chan, 2018; Salvia et al., 2019). One area that has received special attention is the mapping process of research contributions to specific SDGs. Major projects, such as STRINGS and AURORA's SDG analysis, are two examples of such initiatives, both coordinated by larger university networks.

The STRINGS (*Steering Research and Innovation for Global Goals*) consortium aims to map development pathways for science, technology and innovation that best address the UN Sustainable Development Goals in Low and Middle-Income countries (STRINGS, 2021). The AURORA universities network has developed an SDG analysis dashboard, demonstrating the societal relevance and societal impact of research produced by the nine AURORA universities. The dashboard links research contributions to specific SDGs and shows how research has been utilised by policymakers (AURORA Universities Network, n.d.). Moreover, amongst the SDG Accord signatories, increasingly more institutions require their researchers to outline how their intended research will contribute to SDGs when submitting research applications (10% increase compared to 2019) (The SDG Accord, 2020).

## 3.5 Good practices & obstacles

Incorporating sustainability into institutional and departmental strategy is an important step towards broader, system-level change towards sustainability. This chapter identified several promising initiatives at the global level that have encouraged HEIs to embed sustainability into their strategic plans and priorities. Having a global framework such as Agenda 2030 for Sustainable Development can help to generate momentum and prioritise sustainability initiatives. It provides a platform for new initiatives to flourish, such as the SDG Accord and the SDG mapping of research, and it makes existing programs such as Education for Sustainable Development regain popularity. When aligned with regional or national initiatives providing tangible incentives such as the European Universities Initiative, global agendas can further encourage universities to embed sustainability in their institutional and departmental strategies. However, the literature suggests that sustainability strategies should

not be an isolated top-down exercise. A major obstacle identified by HEIs that are trying to advance sustainability initiatives was a lack of awareness from staff and students. Using a bottom-up approach and engaging in a dialogue with diverse stakeholders are some of the ways to address this challenge. External stakeholders and the larger public discourse taking place in the external surroundings of HEIs play an important role in making sustainability an integral part of the institution's values and embedded it in the academic units.

# IV. MONITORING AND ORGANISATIONAL LEARNING

## 4.1 Introduction

Many universities have either pledged to contribute towards SDGs or to become more sustainable institutions overall. To monitor the progress made in implementing the sustainability strategies adopted by universities will require information tools. Such monitoring tools allow universities to assess their progress against goals and to see where they are in terms of their sustainability-related initiatives. Monitoring also allows universities to learn about what worked and whether they should take particular actions to better achieve their goals. A number of monitoring tools have been applied in initiatives undertaken by universities and university alliances. Examples are the Sustainability Tracking Assessment & Rating System and the UI Green Metric. This chapter discusses some of these monitoring instruments, including the performance indicators used for monitoring and evaluating the universities' sustainability efforts and how they can help this project to build an aligned metric to monitor and evaluate the practice(s).

Figure 3: Analytical framework – Monitoring & Organisational Learning


Adapted from Schneider & Ingram (1990)

## 4.2 Monitoring sustainability in a global context

A variety of tools for measuring and assessing are mentioned in the literature. While some strategy documents published by universities sometimes only mention the need for sustainability, other strategies explicitly list key performance indicators touching on sustainability. Examples are the STARS, the sustainability- or SDG-oriented rankings (e.g. THE Impact ranking, UI Green Metric), and some universities publish a sustainability report as part of the SDG Accord requirements. The popularity of these tools has grown as more stakeholders demand higher education institutions to demonstrate their attention for sustainability and SDGs in a transparent manner. Monitoring tools allow HEIs to systematically measure, audit, benchmark, and communicate sustainable development efforts (Findler et al., 2018). Data collection is a key part of further developing institutional strategies and policies.

Monitoring and assessment instruments also promote organisational learning, raising awareness and building consensus. It lays the foundation for improved decision making. These tools are particularly helpful when stakeholders within the institutions recognise the need for sustainability reforms, but lack information about the support needed and the main obstacles. Such learning tools can be used to identify good practices and institutional strengths as well as potential areas of improvements and where to make further investments. In addition, the tools can facilitate dialogue between different stakeholders.

Sustainability assessment tools and indicators have received considerable attention in higher education research. Previous research has spanned across a range of topics, including assessment of conceptual sustainability frameworks, environmental management systems, indexes such as campus ecological footprints, life cycle assessments, auditing approaches and comparative and rankings tools (Ramos & Pires, 2013). Despite considerable attention in research, the development and implementation of effective assessment and benchmark tools is still seen as a challenge (Martin, 2012).

To shed light on the global trends in sustainability monitoring, we provide a brief overview of some of the most widely used sustainability assessment tools: the STARS (Sustainability Tracking Assessment & Rating System) system, the THE Impact Ranking, and the UI Green Metric. In addition, we again briefly mention the SDG Accord annual survey and the UniSAF framework provided by the Green Office Movement. The latter is a comprehensive tool developed by students. While some tools have been around for over a decade (e.g. STARS), others have gained more worldwide recognition in recent years (e.g. THE Impact Ranking). The popularity of the tools varies, based on geographical region and application options. Some institutions may choose rankings while others prefer ratings (e.g. labels) or self-assessment tools.

From the tools mentioned above, STARS is the oldest available option. Launched in 2009, the Sustainability Tracking, Assessment and Rating System (STARS) is a self-reporting framework

for higher education institutions developed by the Association for the Advancement of Sustainability in Higher Education (AASHE). STARS was co-created through a collaborative stakeholder consultation process over a three-year period. In 2010 it became available in the US and Canada and a year later to the rest of the world (Urbanski & Leal Filho, 2015). The STARS rating has four levels (bronze, silver, gold, platinum) and assesses sustainability performance across a wide range of impact areas, including education, research, outreach, operations, diversity and health. In 2020 more than 1000 institutions from 42 countries were registered for STARS, of which 450 were either rated or actively pursued a rating (AASHE, 2020a). Currently, more than 90% of the registered institutions are located in North-America (AASHE, 2020b).

The UI Green Metric World University Ranking, launched by Universities Indonesia in 2010, provides information about the sustainability efforts of universities around the world (UI Green Metric World University rankings, 2019c), predominantly focusing on environmental sustainability and operational measures (82 %). The ranking covers six categories: education and research (18%), energy and climate change (21%), transportation (18%), waste (18%), setting and infrastructure (15%) and water (10%) (UI Green Metric World University rankings, 2019a). The data is collected through an online survey sent to university administrators (UI Green Metric World University rankings, 2019b).

The Times Higher Education (THE) Impact ranking was first released in 2019, and so far is the only ranking assessing higher education institutions' performance against the 17 United Nations Sustainable Development Goals. In 2020, in its second edition, 768 higher education institutions from 85 countries participated in the ranking (Times Higher Education, 2020a). The indicators cover four broad areas – research, stewardship, outreach and teaching. Universities can submit data on as many SDGs as they are able. Institutions that submit information on SDG17 and at least three other SDGs are included in the overall ranking. The THE Impact ranking also publishes results on each SDG separately. For most measures, institutions collect and self-report data while for research metrics external data on bibliometrics and patents are used (Times Higher Education, 2020b).

The SDG Accord, launched in 2017, has been signed by 178 institutions worldwide committed to embedding SDGs into their education, research, leadership, operations, administration and engagement activities, and report their progress towards SDGs on annual basis. Every year survey results of the signatory institutions are published, identifying progress made, priority areas and the key obstacles (The SDG Accord, 2020).

The University Sustainability Assessment Framework (UniSAF) is an open-source, sustainability assessment tool with concrete indicators across five dimensions – education, research, community, operations, governance. Co-created by students, and offered by the Green Office Movement, it is a comprehensive and customizable framework used for self-

reporting at institutional level. UniSAF has been piloted at multiple European higher education institutions (Green Office Movement, 2020).

## 4.3 Good practices & obstacles

A variety of sustainability assessment tools have been developed over time, enabling HEIs to systematically measure, audit, benchmark and communicate their sustainability efforts (Findler et al., 2018). The numerous advantages of using sustainability assessment tools include the ability to establish a performance baseline, identify good practices and opportunities, develop processes for further improvement, and develop mechanisms for data reporting and dissemination (Urbanski & Leal Filho, 2015).

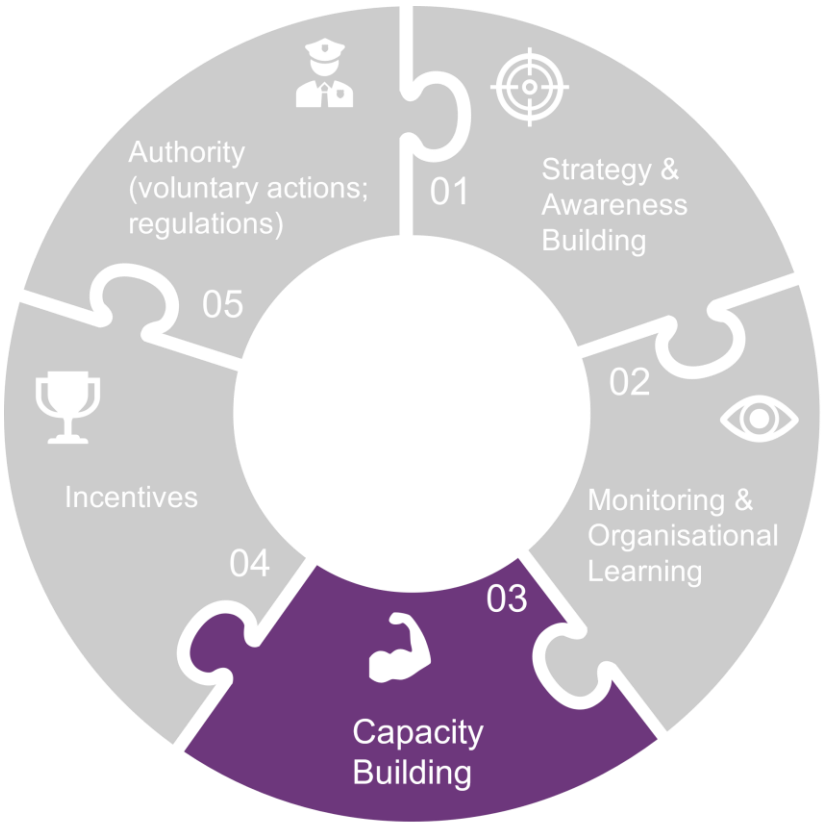
Some of the criticism on the sustainability indicators and traditional frameworks is that the set of pre-defined indicators fails to properly facilitate and inform decision-making in a helpful manner (Ramos & Pires, 2013). Furthermore, since different tools employ different methodologies, the final scores for the same institution can vary considerably, depending on the assessment tool used (Berzosa et al., 2017). A variety of tools can also encourage institutions to selectively pick ('cherry-pick') the tool that places the institution in the best light, rather than focusing on a wish for ongoing improvement over time. Moreover, collecting data for standardized indicators is a resource-intensive process, and tools that promote competitive benchmarking may pose a risk for institutions to come across as being more market-driven rather than focusing on societal interests (Berzosa et al., 2017). Finally, the tools mentioned here are predominantly designed to assess institutions' sustainability performance rather than performance at the academic unit level. Such an approach may inhibit highly performing academic units from being recognised for their achievements either at their own institution or regional and international level.

# V. CAPACITY BUILDING

## 5.1 Introduction

Strategies and visions alone will not suffice to attain the necessary transformation towards sustainability. To overcome the barriers for transformation, by far the most popular methods are related to training and professional development – in short, capacity building. Capacity building is one of the most important areas HEIs can consider. It provides information, training, skills and resources to enable individuals, or groups to make decisions or carry out activities (Schneider, 1990). A lack of capacity can be a major barrier for the attainment of sustainability goals. This section reviews promising areas for capacity building in education and research, while also reflecting on good practices and obstacles in HEIs.

Figure 4: Analytical framework – Capacity Building




Adapted from Schneider & Ingram (1990)

## 5.2 Capacity building in education

Under the global framework of the UN's 17 SDGs and Agenda 2030, Education for Sustainable Development (ESD) has become one of the integral steps towards addressing sustainability challenges (UNESCO, 2017). The increasing interest in SDGs worldwide has encouraged many HEIs to pay more attention to sustainability education, and consequently ESD has gained increasing attraction among HEIs. The new strategy - ESD for 2030 - establishes clear links between ESD and SDGs, and is likely to further strengthen this trend. One of the key pillars for ESD in the next decade is strengthening the capacity of educators, enabling them to teach sustainability and SDG-related content, while applying transformational pedagogies (UNESCO, 2020).

Educators' capacity in sustainability-related education heavily relies on their ability to understand, utilize, or develop ESD-specific learning content and curriculum. The vision embedded in ESD and spearheaded by UNESCO, calls for the integration of sustainability in curricula and textbooks at all levels of education (UNESCO, 2017). A successful implementation of such reforms is ultimately influenced by the educators' knowledge and ability to integrate ESD into the curriculum (Edwards et al., 2020). To foster curriculum change, institutions need to provide ESD professional development opportunities for their educators (Mader et al., 2014; UNESCO, 2014) .

The pedagogical approach of ESD is holistic and transformative. As primary actors in carrying out ESD, educators are mentors and navigators, facilitating the learning and development process of students. A learner-centred approach is a cornerstone of ESD, emphasizing the changing role of educators: students are treated as independent learners instead of passive receivers; attention is placed on facilitating the development of student competencies instead of directly transferring structured knowledge. To effectively transmit a ESD learning approach to students, educators need to be competent in their knowledge, skills, values and pedagogical practices (UNESCO, 2020).

The main learning objectives for educators seeking to develop ESD capacity entail: gaining a better understanding of sustainable development and key challenges; developing interdisciplinary perspectives on sustainability issues within local and global contexts; practicing action-oriented, transformative and interactive pedagogies; and identifying holistic learning environments for local learning opportunities. In addition, the educators need to support students in developing eight key competences associated with an ESD learning approach. These are: systems thinking, critical thinking, integrated problem solving, anticipatory, normative, strategic, collaboration and self-awareness competencies (UNESCO, 2017) (see appendix, table 1 for brief descriptions).

In 2014, a 'state of the art report' was released, mapping opportunities for developing ESD competences among educators in HEIs. Funded by the EC, the three-year project involved 54

partners across 33 countries in Europe. Through the analysis of national and regional reports and collected data, the authors identified several trends relevant for educator capacity building in the higher education sector. First, it was noted that, despite the growing popularity of ESD in higher education, most countries provide very limited ESD-related professional development opportunities for their educators. Second, university educators engaged with sustainability topics tend to address the relevant content in their classroom, but rarely reflect on their pedagogical approaches. An ESD approach, as intended, should address both content and pedagogy. Third, university educators need to develop ESD competencies to successfully carry out the curriculum, yet the existing frameworks have shown to be too complex for practical application (Mader et al., 2014).

Pedagogically skilled educators are better prepared to engage students in ESD learning experiences and facilitate the development of students' sustainability competencies. Escobar-Tello and Bharma (2013) noted that well prepared ESD projects reduce students' energy consumption while increasing their happiness and willingness to promote sustainable lifestyles. On the other hand, a study by Kieu et al. (2016) showed that students' negative feedback toward ESD at a university level was related to the lack of interactive teaching and learning in the classroom. Edwards et al. (2020) indicated that the educators' knowledge of ESD topics and perceived value of the learning approach affect their teaching pedagogies, especially in regard to being truly transformative. Promising approaches associated with more interactive pedagogies are interdisciplinary, action-oriented and community-based learning.

Interdisciplinary learning content encourages students to view sustainability problems from multiple perspectives, reflect on the complexity and intersectionality of the problems and propose holistic solutions. Wu and Shen's (2016) systematic review indicated that researchers and educators have started to increasingly realize the importance of integrating multidisciplinary content within higher education programs. While formerly curriculum design for sustainability education mainly focused on the environmental factors, new programs also cover social, economic and intercultural factors that go beyond a single scope of understanding.

Action-oriented and experiential learning are key pedagogical approaches for ESD (UNESCO, 2017). Based on Kolb's theory, experiential learning focuses on the actual experience, observation and reflection, forming and applying general concepts in upcoming situations (Kolb, 1984). When put to practice, examples include internships, undergraduate research, service-learning, professional and creative work experience etc (Sonetti et al., 2020). Many HEIs collaborate with external stakeholders to provide their students with experiential learning experiences. The Global Citizenship Program (GCP) is a good example of experiential learning, where students had opportunities to engage with NGOs, and both students and faculty staff were encouraged to pursue exchange programs abroad (Sperandio et al., 2010). As part of capacity building programs for educators, experiential learning is often taught in forms of

diversity training, learning strategies and techniques in experiential contexts and fieldwork experiences in student communities of different backgrounds (Edwards et al., 2020). In general, well-planned, assessed and supervised experiential learning programs are beneficial to promoting sustainability in education, fostering 'interdisciplinary learning, civic engagement, 'green' career development, cultural awareness, leadership, and other professional skills'(Sonetti et al., 2020).

Community or service-based learning is another interactive approach educators can utilize. Findler et al. (2019) noted that positive outcomes often come from the inclusion of the local community in the setting for learning. For example, students' understanding of SD could be fostered through participation in local initiatives (Anand et al., 2015). These projects can also build the educator's capacity in facilitating learning linked to real-life SD problems. Moreover, NGOs can be valuable partners in helping to develop a community based-learning curriculum, reviewing the existing curriculum, or tailoring the learning content to ESD (Edwards et al., 2020). A few challenges might stem from the collaborative programs between the NGOs and the universities. Kieu and Singer (2017) reported a case where an NGO had a paramount ambition for its courses, yet poor supervision and coordination of the implementation process. This led to unparallel class schedules between those of the university and those of the programs, lengthy lectures and confusions in trainee recruitment etc.

## 5.3 Capacity building in research

Since the 1990s, the number of papers focusing on sustainability topics has increased substantially. In 2018, more than 35,000 academic articles addressed sustainability topics. Sustainability research is important, because research insights can help government officials, companies and research organizations to better prioritize future research and investment priorities (Asatani et al., 2020).

Reflecting on the early trends of sustainability research (1991-2010), Kordestani et al. (2015) identified trends in authorship, stakeholders involved, and research topics. Across the two decades studied, authorship had evolved from a more single-author approach towards the use of multiple authors, signalling that research is becoming more interdisciplinary. This is also supported by a shift in focus from the economic aspects of sustainability in the first decade to a stronger emphasis on operations, technology, tourism and hospitality in the second decade. Moreover, in the first decade, sustainability was a topic highly prioritized by governments and western countries, while in the second decade, private sectors and developing countries became more active in sustainability research. Moreover, while in the first decade sustainability research focused on principles and policies largely endorsed by governments, in the second decade, research increasingly started to focus on sustainability practices and achievements. The shift partially happened because in the first decade, new government laws

led to updated corporate policies, and firms started developing their sustainability knowledge with outcomes emerging in the second decade (Kordestani et al., 2015).

Since 2015, there has been an increased effort to link sustainability research to specific sustainable development goals (Asatani et al., 2020; Salvia et al., 2019; STRINGS, 2021). Several initiatives, such as STRINGS (STRINGS, 2021) and AURORA (AURORA Universities Network, n.d.), led by university networks, focus on creating a reliable system of linking research topics to SDGs. While considerable progress has been made and AURORA has produced an initial SDG bibliometric dashboard for its member institutions, methodologies are still being revised and updated. Also, the number of academic articles on SDGs is increasing, and several have explored SDG priority areas and geographical coverage (Asatani et al., 2020; Salvia et al., 2019). According to a survey with 266 sustainability experts from across the world, some research trends are global while others have more local relevance. Climate change (SDG 13) is a topic that is heavily researched in all regions, but priority areas for other goals differ across regions. For example, in Africa the focus is on fighting hunger, poverty, improving access to water sanitation, reducing inequalities while Europe prioritizes education, industry, innovation and infrastructure and sustainable consumption and production. The pattern likely shows that regions focus on global challenges with local relevance (Salvia et al., 2019).

Research focusing on sustainability in higher education has also grown considerably in the 1990s, both in terms of papers published as well as variety of topics covered. The evolution of research trends have been demonstrated by Leal Filho et al. (2021), reviewing more than 1700 articles published between 1987 and 2019. Research trends over time show that a focus on sustainability education and learning has been strong since the outset, influenced by the UN's Decade of Education for Sustainable Development (DESD, 2005-2014). More recently, researchers started paying attention to 'green campus' movements, 'living labs' and reducing the environmental impact of campuses. Less research has been done on sustainability leadership and governance and ways to build capacity within the community.

In terms of the future research agendas of HEIs, Olawumi & Chan (2018) suggests that researchers could concentrate more on the emerging sustainability research themes, such as ecological footprint, Life Cycle Analysis, sustainability assessment models, policy analysis and monitoring, evaluation metrics, and stakeholder participation. Salvia et al. (2019) stressed that it is important to further research specific implementation of SDGs in different contexts, conduct comparative research on factors hindering progress, and what resources are made available to address these issues by different countries. In addition, there is a need for an academic community to provide technical support in the implementation process of SDGs (Salvia et al., 2019). To address neglected sustainability topics, researchers should utilize research networks such as the Inter-University Sustainable Development Research Programme (IUSDRP) or the European School of Sustainability Sciences and Research (ESSSR) (Leal Filho et al., 2021).

## 5.4 Good practices & obstacles

Capacity building for higher education staff and students is critical for advancing sustainability transformations in academic departments. The ESD approach requires educators not only to possess good content knowledge about sustainability, but also the pedagogical skills to deliver transformational and action-oriented learning experiences to students. The learning content needs to consider interdisciplinary perspectives and learning environments to reach beyond the traditional classroom, for instance, by involving external stakeholders (UNESCO, 2017).

Educators used to more traditional top-down teaching approaches may struggle to introduce ESD in their classrooms, unless additional support is provided, including professional development opportunities. Research has shown that pedagogically skilled staff, confident in their knowledge on sustainability topics are better able to deliver engaging ESD learning experiences (Edwards et al., 2020; Escobar-Tello & Bhamra, 2013). Yet, despite growing popularity of ESD, very few countries provide ESD-related professional development opportunities for their educators (Mader et al., 2014). HEIs and academic units can take the lead and establish their own ESD professional development opportunities for their educators. Furthermore, institutions and academic units can create synergies by linking ESD with already existing interactive learning approaches utilised by their educators, such as action-oriented and community-based learning.

Sustainability research has expanded in quantity and variety of topics covered, interdisciplinary research has increased. Sustainability research was earlier mostly carried out in western countries but now is becoming increasingly popular in developing countries (Salvia et al., 2019). All of these trends are pointing to promising practices in sustainability research. However, while topics such as climate change (SDG13) have gained significant popularity, other research areas have so far been neglected. Leal Filho et al. (2021) suggest that researchers should utilise existing research networks to identify promising partnerships that could help to address these areas. Moreover, Salvia et al. (2019) propose that the academic community needs to be more active in providing institutional support for the implementation process of SDGs, identifying obstacles, resource needs, and conducting comparative analysis across contexts.

# VI. INCENTIVES

## 6.1 Introduction

Organizational change to embrace sustainability is a resource-intensive process, often competing with other priorities of higher education departments. One way to encourage a department's staff to prioritize sustainability initiatives and to encourage them is to utilize incentive tools. Incentives can encourage academics and their departments to carry out particular activities. Incentives may come in different forms, such as rewards, subsidies, recognition in rankings, promotion criteria, or prizes. In this chapter we specifically focus on financial and reputational incentives.

Figure 5: Analytical framework – Incentives


Adapted from Schneider & Ingram (1990)

## 6.2 Sustainability incentives in a global context

Recent survey results on sustainability leadership showed that 80% of academic leaders identified a lack of funding as one of the major obstacles for pursuing sustainability leadership, aligned with previous studies (Di Carlo et al., 2019; Leal Filho et al., 2020; Leal Filho et al., 2018). Similar obstacles were mentioned in the SDG Accord survey, where financing and capacity building were identified as the two major barriers to embedding SDGs within higher education institutions (The SDG Accord, 2020). Establishing a steady funding commitment to sustainability initiatives was proposed as one of the most promising approaches to address this issue (Leal Filho et al., 2020).

The European Universities Initiative, launched in 2019 by the EC, provides funding to transnational university alliances to collectively tackle the grand societal challenges, with many of them focusing on sustainability. EC funding for the alliances is provided for a period of three years, with a total budget of up to 5 million euros per alliance from the Erasmus+ program. This financial incentive encourages transnational collaboration and capacity building in high priority areas such as climate protection, migration and health. In 2020, the EC had granted funding to 41 alliances representing more than 280 higher education institutions from over thirty European countries (European Commission, 2019b, 2020c). The formation of alliances and collaborations can be further encouraged through national funds. Some countries provide national funding on top of the EC funding for their national universities participating in these alliances.

Some national governments and research councils also award financial incentives to encourage their HEIs to pay attention to sustainability in education and research. To steer their academic research agendas or to innovate their educational portfolio, individual HEIs may also provide financial incentives from their own resources – at the institutional or departmental level. Funding can be provided as a one-off incentive awarded on a competitive basis, as co-funding, or in the form of more structural funds for supporting particular sustainability goals or sustainability initiatives.

Rankings are some of the most well-known reputational incentives, awarding prestige to the HEIs that are placed in the rank order. Rankings compare institutions against each other on various performance indicators, often resulting in a ranked list format. Two well-known sustainability rankings in the higher education sector are the Times Higher Education Impact Ranking (Times Higher Education, 2020a) and the UI Green Metric World University Rankings (UI Green Metric World University rankings, 2019a). The Sustainability Tracking, Assessment and Rating System (STARS) is another well-known rating tool (see section 3.1).

## 6.3 Good practices & obstacles

A lack of funding for the sustainability agenda has been identified as a major obstacle for driving sustainability initiatives in higher education (Di Carlo et al., 2019; Leal Filho et al., 2020; Leal Filho et al., 2018). Financial incentives, such as funding provided through European University Initiative, can be used not only to address the need for resources, but also to stimulate capacity building and staff development (see section 4.2), or encourage collaboration and knowledge exchange between different HEIs and departments. Several of the European Universities Alliances (e.g., AURORA and ECIU) have a strong focus on sustainability initiatives (Aurora European Universities Alliance, n.d.; ECIU University, n.d.). While financial incentives can be very effective, these resources are often limited in volume and competitive in character. Thus, combining financial incentives with other tools, such as encouragement tools (strategy and awareness building), monitoring mechanisms, or capacity building is both a necessity and a way to create positive synergies.

Reputational incentives can be attractive because of the prestige they can bring if a high position in a ranking is attained. This can help promote the HEI, and make it more attractive for prospective students and staff, generating increased demand for its programs. Reputational incentives, however, are often based on standardized indicators, which generally favour already well-established, research-intensive, English-speaking universities (Fauzi et al., 2020). Rankings focusing on sustainability tend to include more experimental, less traditional metrics, creating options for new universities to appear in the rankings, as exemplified by the THE Impact ranking.

# VII. AUTHORITY, VOLUNTARY ACTIONS

## 7.1 Introduction

Most HEIs have hierarchical systems of authority and governance, where top-down decisions only trickle down slowly along the hierarchical ladder. HEIs often rely on authority tools, such as regulations and procedures, to guide the behaviour of their employees. These authority tools range from softer approaches, such as granting permission for voluntary actions, to more stringent measures, such as mandating compulsory actions (e.g., about recycling of waste or use of energy). The use of these tools also extends to students. For instance, on the one hand students are required to choose particular courses as part of their educational program, while on the other they get freedom to choose particular elective courses or thesis subjects. Another example is granting students permission – or even encouraging them – to carry out voluntary activities during their time in the classroom or on campus. This chapter also focuses on some of the softer measures that HEIs can utilize to grant students permission to carry-out self-initiated bottom-up sustainability initiatives while making use of their higher education institution's platforms or facilities.

Figure 6: Analytical framework – Authority (voluntary actions; regulations)


Adapted from Schneider & Ingram (1990)

## 7.2 Authority and voluntary actions in a global context

For achieving a sustainable future, young people are often seen as change agents. In recent years many have joined global sustainability movements, such as 'Fridays for future' or Extinction Rebellion, demanding that world leaders take action towards more sustainable practices. A considerable number of these young people are students, who use the HEIs and their channels as a platform to pay attention to sustainability initiatives and use their university or department to bring their ideas into practice.

Students, with their ability to function outside the traditional decision-making hierarchy, are capable of generating impact using a more grass-roots approach, pressuring and informing changes within their HEIs in ways the institutions' employees cannot (Helferty & Clarke, 2009). Student engagement and their collective actions highlight the need for a legitimate bottom-up structure among HEIs, focusing on sustainability experiences at the base. Recent efforts have pushed for a collaborative bottom-up structure to instigate institutionalised sustainability. For example, The Green Office Movement, launched in 2010, provides a sustainability platform that enables students and staff in HEIs to collaborate on institutionalising sustainability. The projects undertaken are approved by the HEIs' management and financed through the HEIs' own resources. Nearly 60 Green Offices have been launched worldwide, and a large majority is located in Europe (Green Office Movement, 2021).

Scholars have agreed on the fact that active engagement of campus stakeholders is essential in achieving sustainability in Higher Education (Murray, 2018). In particular, student engagement represents a bottom-up approach in developing a 'deep organizational transformation' that is fundamental to sustainability in higher education (Shriberg & Harris, 2012). Thus, it is necessary for HEIs to discuss their students' involvements and initiatives – also because it potentially leads to capacity building around sustainable development within their own learning communities. Most capacity-related student initiatives focus on the subject of 'behavioural change' on an individual level. Student-led initiatives often raise awareness and change the campus community's behaviours as a way to build capacity and create impact. For example, these actions often include awareness campaigns, eco challenges or transportation initiatives (Murray, 2018).

Student initiatives, due to the nature of the students' identities, are often met with many barriers. Some of the barriers are a lack of resources or a lack of power on the part of the students, a lack of understanding of the internal dynamics in their HEIs, and sometimes even a lack of student involvement (perhaps caused by a lack of time on the part of students). Nevertheless, in addressing these challenges, Murray (2018) identified two major drivers that supported student-led actions in providing solutions: collaborations and interdisciplinary approaches.

Collaborations include initiatives where student unions/associations or other student groups work with groups and organisations located outside their local campus. For example, on-campus students may have successful partnerships with national student organizations or international organisations such as the Sierra Youth Coalition in Canada (Helferty & Clarke, 2009). In China, the Student Environment Association was able to connect 'student green groups' across the country to share resources and information between different campuses (Hongyan, 2003). These student-led practices offer their communities platforms to build capacity in sustainability.

Students, among themselves, may also actively push for the expansion of the scope of sustainability developments. They sometimes point to disciplinary silos that hamper their campus sustainable development efforts and push for interdisciplinarity to drive change on their campus. Successful implementation of initiatives, in particular regarding behavioural change towards an interdisciplinary campus sustainability culture, can lead to considerable opportunities and activities to build capacity among students (Murray, 2018).

## 7.3 Good practices & obstacles

There are good examples of student-led initiatives, where collective actions by students in a bottom-up approach promote sustainable behavioural changes within campus communities. Sustainability-related student campaigns and voluntary activities by student organisations have the potential to raise awareness and urge eco-friendly behaviours, such as reducing the campus or the department's carbon footprint or using more environmentally-friendly transportation modes. Other examples involve student collaborations on a national level, extending the scope and creating broader student sustainability platforms; student engagement and introduction of an interdisciplinary sustainability culture, promoting a holistic understanding of sustainability and forging the students' sustainability competencies across disciplines (Elliott & Wright, 2013; Helferty & Clarke, 2009; Hongyan, 2003; Shriberg, 2003).

However, student initiatives often face certain challenges, such as a lack of funding, insufficient institutional power, or a limited capacity to expand student involvement (Duram & Williams, 2015; Helferty & Clarke, 2009; Hongyan, 2003). These challenges jointly point to the major limitation of student-led actions: the incapacity to infer or generate sustainable institutional changes in sustainability (Murray, 2018).

In order to move from a few student-led initiatives to a widely supported sustainability culture that truly includes the students' concerns, a legitimate bottom-up structure is called for. Such a structure has the potential to support cooperation among and between different levels and stakeholders in the HEIs (i.e., students, faculty, management, support staff, et cetera). For

example, the Green Office Movement offers a sustainability platform that allows students and staff to work together on institutionalising sustainability (Green Office Movement, 2021). The Green Offices often provide internships to students, including students in the development of sustainability awareness building within HEIs. Other examples such as student inclusion in the university's waste management feasibility plan or students' and professors' involvement in the construction and use of a tri-generation plant on campus represent a comprehensive collaboration between multiple levels of the HEIs (Sonetti et al., 2020). These collective networks and programs address the limitations of student sustainability activities while maintaining a bottom-up approach where student voices are heard and are factored into the institution's sustainability holistically.

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## APPENDIX: Education for sustainable development competencies

Education for Sustainable Development distinguishes between eight core competencies that students need to acquire (see Textbox below) throughout their studies. The competencies represent the important attributes that sustainability-oriented citizens need to have in order to deal with today's complex societal challenges. According to UNESCO (2015), competencies are not taught, but rather acquired by the learners themselves during their activities, through experience, and from reflection. Educators, during this acquisition process, are responsible for engaging students in a learning environment that allows for competency development. Their capacity to guide relies on their capacity to create and maintain a holistic learning environment.

EIGHT KEY COMPETENCIES FOR SUSTAINABILITY

1. **Systems-thinking competency:** 'The ability to analyze complex systems across different domains and scales' in sustainability: the understanding of systems from domains of society and environment to economy and education, from a global scale to a local scale. (Wiek, 2011)
2. **Anticipatory competency:** The ability to evaluate, analyze and craft big pictures of the future in sustainability: 'long-term future orientation and envisioning, the anticipation and prevention of harmful unintended consequences, and the imperative of intergenerational equity' (Wiek, 2011).
3. **Normative competency:** The ability to identify and understand norms behind actions; reconcile and negotiate sustainability values, principles, goals and targets, under the existing or future states of the systems: conflicting interests, uncertain knowledge and contradictions.
4. **Strategic competency:** The ability to design and implement transformative strategies and innovative actions towards sustainability at different levels.
5. **Collaboration competency:** The ability to facilitate collaboration and participatory problem-solving, perform empathic leadership and deal with conflicts.
6. **Critical thinking competency:** The ability to question perceptions, actions and norms in the sustainability discourse, and to reflect on one's own position, perceptions and actions.
7. **Self-awareness competency:** The ability to be aware of and reflect on one's personal role in the community and society, and to keep on assessing and motivating one's own actions.
8. **Integrated problem-solving competency:** The comprehensive ability to utilize and combine the above-mentioned competences to problem-solve complex sustainability issues using different frameworks, while generating feasible, equitable solutions that promote SD.

(UNESCO, 2017; Haan, 2010; Rieckmann, 2012; Wiek et al., 2011)

Textbox 1: ESD competencies

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