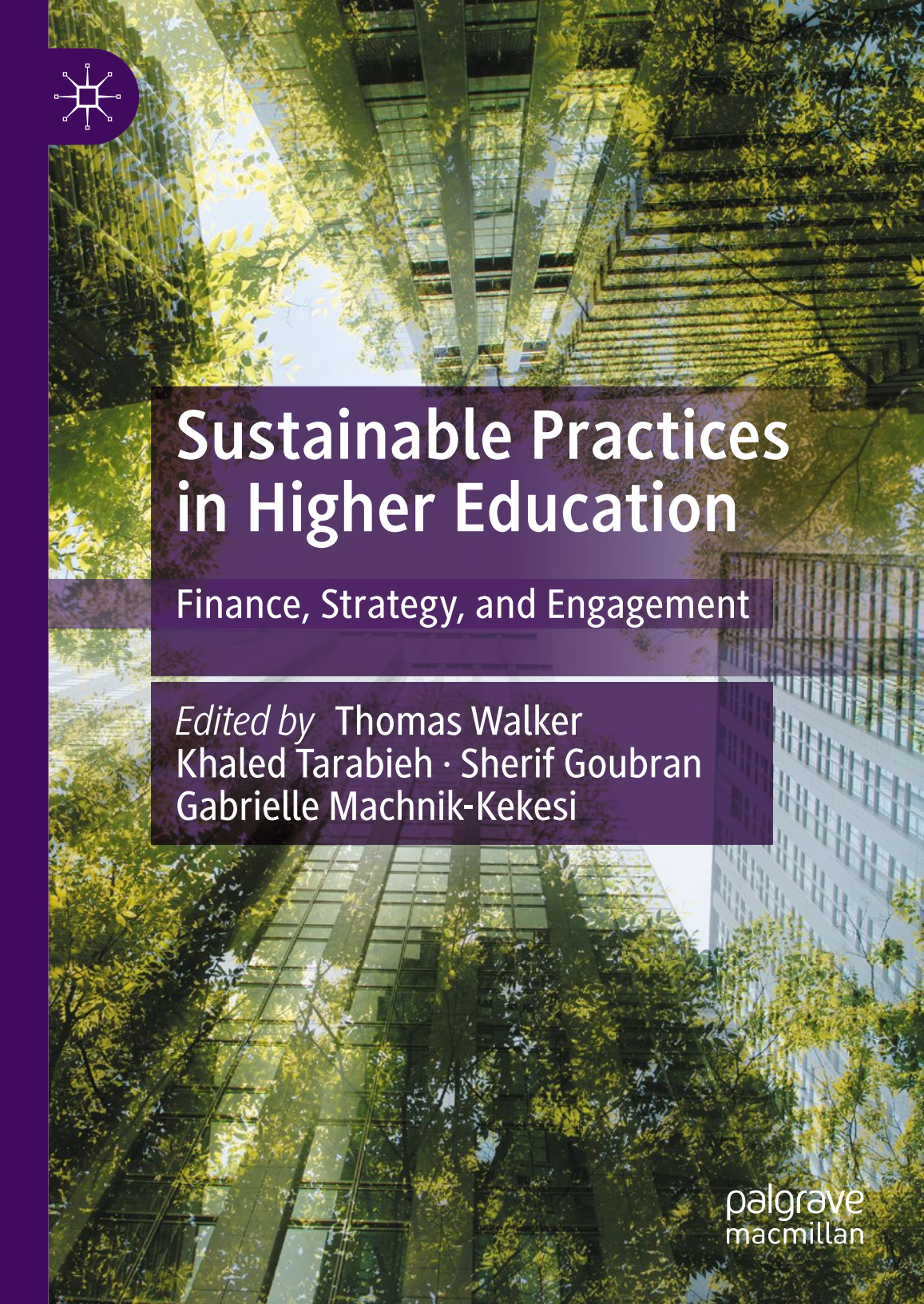
Sustainable Practices in Higher Education
Finance, Strategy, and Engagement
Edited by Thomas Walker
Khaled Tarabieh · Sherif Goubran
Gabrielle Machnik-Kekesi
palgrave
macmillan

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Sustainable Practices in Higher Education: An Introduction

Thomas Walker, Khaled Tarabieh, Sherif Goubran, and Gabrielle Machnik-Kekesi

1 Introduction

Sustainability-inspired initiatives and financial decisions can direct funds toward projects that further embed sustainability within higher education institutions (HEIs) without necessarily resulting in a deficit or sacrificing on financial returns. Embedding sustainability within an HEI's culture and strategic directions is now critical to attracting new students and developing new sustainability-themed programs. Indeed, sustainability has a growing influence on an institution's rankings (as reflected by the Times

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Higher Education (THE) impact rankings[1]). Filho et al. (2019) note that "the question of how universities could be agents of change by putting SDGs and sustainability teaching into practice, is crucial and deserves the attention of both practitioners and academics," while acknowledging that there remains a gap in the research about such inclusion.

HEIs are complex organizations that offer a multitude of academic services intersecting teaching, research, and professional development. The advancement, deployment, and organization of these activities often requires multi-leveled and integrated strategic planning that can both aid in the market-positioning of the institution and support its mission. However, HEIs' activities often span beyond their education-focused programs; running university campuses often involves a myriad of operational and planning decisions. Of course, all these activities are guided and affected by the financial decisions of the institution.

Sustainable finance is one of the strategies that HEIs can adopt in an effort to contribute to the Sustainable Development Goals (SDGs). Sustainable finance refers to "financial activities that take into account environmental, social, and governance factors as a means of promoting sustainable economic growth and the long-term stability of the financial system" (Department of Finance Canada, 2022). As Schoenmaker and Schramade (2018) point out, sustainable finance refers to how investing and lending interact "with economic, social, and environmental issues" (p. 4). This type of finance offers institutions such as universities an opportunity to do their part in aligning their investments with their educational missions and help them support the realization of the SDGs. In this sense, financial decisions can be mobilized toward the environmentally conscious principles that are frequently taught in classrooms while aligning them with the HEIs' administrative and governance practices.

This edited collection explores how individual stakeholders—be they staff, faculty, administration, or students—can mobilize in all parts of a university to encourage sustainable development on campus, financially and otherwise. As centers of critical thinking and innovation, HEIs must lead the way in sustainable practices in order to better educate and equip students for actionable change as well as serve as a potential model to

[1] The THE Impact Ranking was launched in 2019 in an effort to assess universities against the 17 SDGs. The methodology behind the ranking can be found here: https://www.timeshighereducation.com/world-university-rankings/impact-rankings-2022-methodology.

others in implementing sustainable practices within their organizations. Our collection aims to set the agenda for future directions at the interface of sustainable development and strategic management.

While prior texts on the subject have offered interested parties' valuable contextual information, case studies on sustainability in universities, as well as country-specific examinations, there remains a gap in the literature concerning the myriad of financial and training dimensions a shift to sustainability may encompass for any given university. Indeed, whereas a significant number of extant studies is guided by attention to a specific region or area, this collection offers international insights into the topic, with findings from Barbados, India, the United Kingdom (UK), Norway, Egypt, and Australia, among others. Moreover, with most studies published before 2019, few studies are framed by the changes HEIs experienced due to COVID-19. The rapid and volatile spread of COVID-19 affected every aspect of daily life across the planet from the last months of 2019, all the way through 2020, 2021, 2022, and still to this day in 2023. Indeed, for the students, faculty, and staff at universities worldwide, campus closures and the quick transition to hybrid or e-learning caused stakeholders in HEIs to swiftly adopt new ways of learning, teaching, and administrating that were unfathomable only months before. This challenging and radical shift left many in academia with a sense that more needs to be done by HEIs to foster sustainability and combat climate change at this time of crisis, particularly because anthropogenic climate change creates conditions that are ideal for the spread of such viruses ("Coronavirus, climate change, and the environment," 2020).

The following section highlights how each contribution of this collection contemplates the importance of strategic planning, decision-making, and governance toward sustainability and climate justice in the context of higher education and beyond.

2 Overview of Content

The collection focuses on how long-term-oriented decision-making can be a catalyst for the uptake of sustainable practices in HEIs. The chapters in this collection highlight the hurdles and challenges that are slowing or derailing on-campus finance-related initiatives and practices geared toward sustainability while also clarifying the limitations and applicability of different sustainable financial tools and policies that HEIs employ. It also showcases the most up-to-date research on sustainable financial practices

in higher education to encourage our anthology's readership to implement such innovative practices in their own academic contexts. The chapters, which are primarily interdisciplinary in their approach, also offer insights on the scalar relevance of the financial policies and tools they present.

The first part of the book explores how novel pedagogical approaches can help accelerate the adoption and uptake of sustainability and sustainable development principles in HEIs. As the first chapter of this part, chapter "Engaging and Empowering Students to Contribute to Sustainable Development Through Developing Interdisciplinary Teamwork Skills" by *Elli Verhulst, Heidi Rapp Nilsen, and Bjørn Sortland*, uses the case study of a Norwegian HEI to show how a university-wide strategic initiative fostered the interdisciplinary skills that students need to contribute to sustainable development. The authors highlight the lessons that can be drawn from such a strategy in HEIs in Scandinavia and beyond. In chapter "Best Teaching Practices in Environmental Sustainability Education: A Cross Country Comparison", *Diola Bijlhout, Teresa Vilaça, and Rebecca Chewitt-Lucas* share five best Education for Sustainable Development (ESD) practices based on their comparative study of Barbados, Portugal, and the United Kingdom. Finally, in chapter "The Future of Hybrid Learning Models and Sustainable Education in the Post-Pandemic Era", *Kruti Dholakia and Jagriti Mishra* respond to the COVID-19-induced shift to online and hybrid teaching methods. The authors review various models and provide recommendations for what aspects of pandemic-adapted teaching we might harness in HEIs moving forward.

The second part of the book focuses on how HEI campuses could be used as training spaces for sustainability practices. In chapter "Education for Sustainable Development as Part of the Initial Training of Teachers in the UK", *Douglas Bourn and Nese Soysal* describe how Initial Teacher Education (ITE) can fill curricular gaps by prioritizing ESD. Using the regional case study of the UK, the authors reveal how there is an increasing demand for the inclusion of sustainability themes in ITE programs and provide recommendations for such pedagogical change. In chapter "Engagement Strategies for Faculty and Staff Who Teach and Advise Sustainability Activists", *Shea Alevy, Josh O'Connor, and Heather Spalding* discuss their work in the Sustainability Knowledge Community (SKC) and provide insight on the intersection between the politicization of sustainability and patterns in HEI governance. In closing, the authors provide readers with a toolkit for teaching and advising student climate

activists. Finally, in chapter "Future Managers' Perspective on Attaining the Sustainable Development Goals and Sustainability in India", *Durdana Ovais, Richi Simon, and Shumayela Hasan* examine Indian management students' grasp of the SDGs and to what degree these influence students' lifestyle choices. The authors suggest how strategic decision-makers might incorporate their findings in policy formation and governance surrounding sustainability in education.

Part III of the book explores how innovation and strategic development in HEIs can help with the incorporation of sustainable and ecological practices. This part starts with chapter "University Extension Programs to Develop Intellectual Property in the Agricultural Sector of Marginalized Rural Communities in the ASEAN Region", by *Robert Brian Smith and Mark Perry*. The authors highlight how universities can assist ASEAN producers in securing geographic indicators (GIs) for locally used herbs and medicinal plants, and how this designation can contribute to safeguarding traditional knowledge and promoting sustainable agriculture. In chapter "Turning Climate Mitigation Concerns into Institutional Sustainability: Using Carbon Accounting as a Tool for Resource Management in a Desert Environment", *Khaled Tarabieh and Sherif Goubran* recount the history of The American University in Cairo's initiative to track its carbon footprint, a first of its kind in the Middle East and North Africa. The authors highlight how measuring the university campus' emissions helped initiate multiple activities that reduced the university's environmental footprint, resource consumption, and costs. They share some key insights on how a simple tracking of activities can be mobilized as a tool for strategic decision-making.

In the final part of the book, we explore how HEIs can utilize approaches that engage multiple stakeholders and collective means to advance sustainability and encourage sustainable development activities. In the first chapter of the final part, chapter "Ideas Competitions as Means for Engagement and Dialogue: A Pedagogical Approach for Investigating Socio-Ecological-Technical Practices", *Carmela Cucuzzella and Morteza Hazbei* examine the 2016 *Ideas* competition for a bus shelter design. In doing so, the authors shed light on the competition's governance and the importance of collaboration while noting the lessons that can be drawn from this specific competition for sustainability-based innovation in HEIs. In chapter "The Engagement Orientation and its Limits in Nurturing Sustainability in Higher Education", *Lukasz Swiatek* demonstrates how HEIs can employ an "engagement orientation" toward sustainability-minded strategic

development and decision-making. By showcasing the case study of Macquarie University in Sydney, Australia, Swiatek shows how such orientation training encourages sustainable practices in higher education.

This collection, with its various contributions, offers diverse perspectives on how the activities of HEIs intersect sustainability practices and principles, and can institutionalize sustainable development objectives in their teaching, research, operations, and strategies. While many the initiatives and approaches examined in this book have a clear financial dimension, further research and analysis is needed to uncover how HEIs' activities can be enhanced through sustainable finance. In particular, future research should explore how public pressures to make HEIs' finances more sustainable could help them realize their mission and lead by example.

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PART I

Pedagogical Interventions Towards Sustainability

Engaging and Empowering Students to Contribute to Sustainable Development Through Developing Interdisciplinary Teamwork Skills

Elli Verhulst, Heidi Rapp Nilsen, and Bjørn Sortland

1 Introducing Education for Sustainable Development

Most current environmental problems, as well as many current societal challenges, require a shift towards sustainable development (SD). Higher education has historically played a role in transforming societies, by educating decision-makers, leaders, entrepreneurs, and academics, and serving the public good (Lozano et al., 2013). Regarding sustainable transitions, higher education institutions (HEIs) have a significant role to play

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in making such transitions happen (Lambrechts et al., 2019; Zhou et al., 2020). An increasing number of universities have been engaged in incorporating and institutionalizing SD into their systems, including initiatives targeting education, research, and outreach, as well as campus operations (Verhulst & Lambrechts, 2015; Weiss et al., 2021a).

One important mission for higher education is to equip students with competencies that engage and empower them to contribute to SD (Lambrechts et al., 2013). A competency thereby implies more than the acquisition of knowledge and skills; it involves the mobilization of knowledge, skills, attitudes, and values in order to meet complex demands (UNESCO, 2018). In Education for Sustainable Development (ESD), an increasing amount of attention goes into defining and working with competencies for SD in higher education (Barth et al., 2007; Wiek et al., 2011). Based on the work of leading researchers in the field, Rieckmann (2018a) presents eight key sustainability competencies for the UNESCO report on *Issues and Trends in Education for Sustainable development*. The key competencies are *system thinking competency, anticipatory competency, normative competency, strategic competency, collaboration competency, critical thinking competency, self-awareness competency*, and *integrated problem-solving competency*. The Norwegian National Committee for Cooperation with Agenda 2030 (2020) takes these eight competencies as a starting point, but also includes *creativity competency* as well as adding a transdisciplinary perspective to the collaboration competency. Next to these "generic competencies for SD," disciplinary knowledge will continue to be important as the raw material from which new knowledge is developed (UNESCO, 2018). Brundiers et al. (2021) developed and refined a framework, building on the key competencies synthesized from the literature. In their work, they not only present the competencies agreed upon among experts, but also include a three-dimensional model linking key competencies in sustainability with basic academic competencies and discipline-specific knowledge. Based on a number of key themes for sustainability,

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topical knowledge on sustainability is adapted to each field of study, for example, sustainable materials in architecture and design, or sustainable business models in business.

The UNECE Strategy for Education for Sustainable Development (2005) proposes a list of 19 key themes for sustainability. Among others they include poverty alleviation, democracy and governance, human rights, gender equity, production and consumption patterns, environmental protection, natural resource management, and biological and landscape diversity. The strategy emphasizes the need for holistic approaches to address such diverse themes in ESD (UNECE, 2005). Today, the UN Sustainable Development Goals (SDGs) provide 17 fields of action for sustainability. The SDGs include clean water, improving health, quality education, and reducing climate change. They were adopted by all United Nations Member States in 2015 as part of the 2030 Agenda for Sustainable Development (United Nations, 2015). Rieckmann (2018b) proposes thematic priorities for ESD based on the SDGs as well as learning objectives within each of these priorities which will "*enable learners to understand key themes, relate to them on an individual and group level and play an active role in promoting sustainability development within these areas.*" The themes being prioritized are climate change, biodiversity, sustainable production and consumption, global justice, disaster risk reduction, and poverty reduction.

Universities need to develop learning environments with educational practices that enable students to develop the competencies that are necessary for sustainability (Zhou et al., 2020). A combination of different pedagogical approaches is thereby needed to develop competencies for SD (Lozano & Barreiro-Gen, 2021). However, one common denominator is that the learning methods must be interactive, participative, action- and research-oriented, and thereby actively involve students in acquiring and processing new knowledge, skills, and a change in attitude (Verhulst & Van Doorsselaer, 2015).

Different scholars propose a range of student-activating learning methods (Ceulemans & De Prins, 2010; Lambrechts et al., 2013; Verhulst & Van Doorsselaer, 2015). These were recently collected in Lozano and Barreiro-Gen (2021). An excerpt from the overview includes *brainstorming; group discussion; group or personal diaries; internships; solving real community problems; problem- and project-based education; Socratic method; case method; debate; and reflexive accounts.*

In order for ESD to get integrated into and practised in higher education, it is important to embed competencies for SD, sustainability knowledge, and student-active learning approaches into higher education curricula. This is another focus area within ESD, illustrated by the vastly growing number of case studies that lift the integration of sustainability in HEI curricula to a strategic level. In a recent study, Lozano and Barreiro-Gen (2021) present 15 HEI case studies, from 12 countries on 4 continents, which provide insights into how sustainability is incorporated in the HEI curricula. They document which competencies are being developed, in connection with the pedagogical approaches that are used to develop these competencies. A meta-study from Weiss et al. (2021a) analyses 131 international cases and presents six patterns of curriculum change processes ranging from *(1) collaborative paradigm change* through *(3) top-down, mandated institutional change* and finally to *(6) limited institutional change*. This and other studies shed light on the drivers and barriers to the implementation of ESD (e.g. Leal Filho et al., 2018; Weiss et al., 2021b). Most of the available cases focus on the curriculum of specific, disciplinary study programs. Moreover, a few curricular initiatives are available that reach out to all students at an HEI in order to develop competencies for SD. Coops et al. (2015) and Aktas et al. (2015) describe two examples of a university-wide course on sustainability: one in Canada and one in the USA. Both courses, which are at the Bachelor's level, aim at crossing the traditional silos of existing disciplinary curricula in higher education.

In this chapter, we present the case of a university-wide interdisciplinary Master's level course, adding valuable insights to the current literature on ESD. We outline how the course incorporates sustainability and how it connects to strategies on different levels at the HEI. Although the course did not originally set out to be a sustainability course, it incorporates sustainability in a variety of ways, including through the development of sustainability skills and the application of interdisciplinary knowledge. Since 2020, this course has gained relevance, as competencies for sustainability are now part of this HEI strategy.

2 How the University-Wide Course Experts in Teamwork (EiT) Engages Students for Sustainability

In the following paragraphs, we describe the background, context, learning outcomes, and pedagogical approaches of our case study, the Experts in Teamwork (EiT) course, to illustrate how knowledge, insights, and

skills are conveyed to students and teaching staff. Simultaneously, we explain how sustainability is integrated in EiT: the level of competencies for SD, the pedagogical approaches, as well as related knowledge on various sustainability themes. The course is being developed over a period of 20 years, as a strategic initiative on interdisciplinary teamwork, launched and supported by the university board. Throughout this period, sustainability has become more explicitly present in EiT, thereby supporting the goal of the Norwegian University of Science and Technology (NTNU) to integrate sustainability in all its curricula in the near future.

Background on Experts in Teamwork

Experts in Teamwork (EiT) is the name of a Master's level course with a focus on interdisciplinary teamwork. EiT is compulsory in all programs of study at a Master's level at NTNU. In EiT, students get mixed across all faculties at the university and work in teams of five to six students, each coming from a different discipline.

EiT was initiated in 2001 within the Master of Science program (MSc), with the initial objective to help students acquire interdisciplinary understanding, develop teamwork competencies, and foster interpersonal communication skills needed for work life (Veine et al., 2019). Due to a decision made by the university board in 2002, EiT was extended to all Master's programs at NTNU. This extension, broadening the program to include students from the social sciences, the humanities, architecture, and medicine, brought with it large pedagogic and organizational challenges and was, therefore, spread over several years (Sortland, 2005). The Experts in Teamwork Academic Section—within the Faculty of Economics and Management—has the overall responsibility for organizing the course.

The EiT course runs every spring semester. Since it involves over 3000 students yearly, the students are divided into more than 100 classes. In the spring semester of 2022, there were 118 classes with a total of 3200 students participating. Each class can be regarded as a separate EiT course, but all the classes use similar learning methods and have the same expected learning outcomes. What differentiates the classes from one another is that each has its own broad interdisciplinary theme related to societal issues or work life. Each class is further divided into five to six interdisciplinary student teams that are supervised by a member of the academic staff and two assigned learning assistants. This teaching team carries the responsibility

for facilitating the project work and team process for their students. EiT has a study load of 7.5 ECTS (one-fourth of a semester) and runs over 15 complete workdays. Each faculty is responsible for organizing a given number of classes, corresponding to the number of students that are registered for the course (Sortland et al., 2021). Of the classes 80 per cent are Norwegian speaking, while 20 per cent have English as a common language.

The Experts in Teamwork Academic Section runs an annual training program for the EiT teaching staff before the start of each teaching period. This training is intended to provide academic staff and learning assistants—coming from all faculties—with the skills in experience-based teaching and facilitation necessary to build an effective, productive, and confident teaching team for each EiT class. It is especially important that the teaching team collaborates well, as their goal is to facilitate student development of teamwork skills. By training the academic staff in student-active learning methods, the teacher training represents a significant contribution to the pedagogical development of teaching staff at the university.

The Experts in Teamwork Academic Section at NTNU initiated a Nordic higher education network founded by Nordplus. The objective of the Nordic Experts in Teams Network is *to train students to utilize their academic competency in interdisciplinary settings, nationally and internationally, to reach enhanced project outputs.* This is achieved by focusing on teamwork skills, that is, increasing the students' awareness of how they contribute as collaborative members in a team. The network currently includes eight HEIs in Norway, Sweden, and Denmark, and additional partners including trade unions, industry organizations, and secondary educational institutions (Nordic Experts in Teams Network, 2021). The main aim of the network itself is to exchange experiences on the educational aspects of similar courses, the organization of similar courses, and the development of new pedagogical methods that enhance interdisciplinary teamwork skills for students. Another aim is to encourage research across HEIs. These efforts have led to the establishment of the bi-annual conference, "Interdisciplinary Teamwork Skills for the 21st Century" or *Its21*. This conference provides a platform where participants in the network, as well as other educators and researchers, can join to inspire each other and work together on major pedagogical and organizational challenges arising in university-wide courses, with a focus on interdisciplinary teamwork skills.

In 2021, the Experts in Teamwork Academic Section received the prestigious award for quality enhancement in higher education, granted by the Norwegian government, for its continuous achievements to innovate, actualize, and improve the course since its inception, and its efforts to educate students at NTNU to develop interdisciplinary teamwork skills and become change agents for sustainable development.

Expected Learning Outcomes and Competencies for Sustainable Development

Each member of the interdisciplinary team may initially have different perspectives on the problem at hand and may be accustomed to different problem-solving methods. The intention in EiT is that students, by working together, will develop valuable attitudes and skills related to interdisciplinary teamwork. By solving a problem that challenges their area of expertise, they will be trained to use their subject skill to contribute to the mutual problem-solving process. Through this process students will be exposed to the challenge of interdisciplinary communication, will learn to operate within an interdisciplinary environment, and will benefit from interdisciplinary interaction and collaboration.

As mentioned, the overall expected learning outcomes and methods are the same in all EiT classes; however, these exist in the context of a broad theme for each class defining the project work. These learning outcomes reflect which competencies the students are expected to develop throughout the EiT course, divided into knowledge, skills, and general competencies, as presented in Table 1. Several of the learning outcomes of the EiT course have a direct connection to competencies for SD. Table 2 shows competencies for SD in higher education, as presented by the Norwegian National Committee for Cooperation with Agenda 2030 in the university sector (National Committee for Cooperation with Agenda 2030, 2020), alongside the intended learning outcomes of EiT (Sortland et al., 2021). The overview indicates a major focus on the development of the *transdisciplinary collaboration competency* as well as a focus on the *creativity competency* and *self-awareness competency* in EiT. These three key competencies are interrelated and encompass the ability to interact constructively and empathetically in a team with people from different professional backgrounds; the ability to come up with creative solutions based on interdisciplinary collaboration; and the ability to reflect on roles, motivations, and emotions.

Table 1 Expected learning outcomes of EiT (Sortland et al., 2021)

Knowledge	K1—Students have gained knowledge about group processes and are familiar with key concepts and prerequisites for good teamwork. K2—Based on experience from the team, students can describe the prerequisites for good interdisciplinary teamwork. K3—Students have insight into how their teamwork is influenced by their own behavior patterns and attitudes, as well as those of others.
Skills	S1—Students can apply their academic learning in cooperation with people from other subject areas, jointly define problems and find solutions to them. S2—Students can apply fundamental group theory and concepts to describe their own specific collaborative situations. S3—Students can reflect on their teamwork and analyse the way that the group communicates, plans, decides, accomplishes tasks, handles disagreements, and relates to professional, social, and personal challenges. S4—Students can provide constructive feedback to individual team members and to the team as a whole and can reflect on feedback from the team. S5—Students can take initiatives (actions) that encourage cooperation, and they can contribute to changing patterns of interaction to create more productive, constructive, and social collaboration in a group.
General competency	G1—Students have extended their perspective on their own specialized knowledge in their encounter with skills from other disciplines. They can communicate and apply skills they have developed in their own field in collaboration with students from other disciplines. G2—Students can collaborate with people from other disciplines, and they can contribute to realizing the potential of their combined interdisciplinary expertise.

Several central scholars refer to the collaboration competency as the interpersonal competency necessary in each step of the problem-solving process (Brundiers et al., 2021, p. 21; Wiek et al., 2011, p. 211). Brundiers et al. conclude by using "the term transdisciplinary research methods as shorthand for methodologies facilitating collaborative research between academics and practitioners with action research being one of them. Interdisciplinarity refers to collaborative research among academics from different disciplines" (2021). Section "Student-Active Learning Methods" will go into more depth as to how these competencies are operationalized in different learning methods.

It is likely that the EiT course also implicitly supports other competencies. This support would depend on the theme of the class, as well as the composition of each team regarding academic and personal qualifications.

Table 2 Key competencies for Higher Education for Sustainable Development (HESD) (National Committee for Cooperation with Agenda 2030, 2020) and expected learning outcomes of EiT

Key competency for HESD	*Definition of key competencies for SD*	*Expected learning outcome of EiT*
Systems thinking competency	The ability to recognize and understand relationships, to analyse complex systems, to think of how systems are embedded within different domains and different scales, and to deal with uncertainty.	
Anticipatory competency	The ability to understand and evaluate multiple futures—possible, probable, and desirable; to create visions for the future; to apply the precautionary principle; to assess the consequences of actions; and to deal with risks and changes.	
Normative competency	The ability to understand and reflect on the norms and values that underlie actions; and to negotiate sustainability values, principles, goals, and targets, in a context of conflicts of interests and trade-offs, uncertain knowledge, and contradictions.	
Strategic competency	The ability to collectively develop and implement innovative actions that promote sustainability at the local level and further afield.	
Transdisciplinary collaboration competency	The ability to learn from others and to transcend the traditional boundaries of discipline or profession; to understand and respect the needs, perspectives, and actions of others (empathy); to understand, relate to, and be sensitive to others (empathic leadership); to deal with conflicts in a group; and to facilitate collaborative and participatory co-creation for problem solving.	K1, K2, K3, S2, S5, G1, and G2
Critical thinking competency	The ability to question norms, practices, opinions, and established theories; to reflect on values, perceptions, perspectives, and actions; and to take a position in the sustainability discourse.	
Creativity competency	The ability to combine anticipatory, transdisciplinary collaborative, and critical thinking competencies to be innovative and to think creatively about solutions to complex problems.	S1

(*continued*)

Table 2 (continued)

Key competency for HESD	*Definition of key competencies for SD*	*Expected learning outcome of EiT*
Self-awareness competency	The ability to reflect on roles in the local community and (global) society; to continually evaluate and further motivate actions; and to deal with feelings and desires.	S3
Integrated problem-solving competency	The overarching ability to apply different problem-solving frameworks to complex sustainability problems and develop viable, inclusive, and equitable solution options that promote sustainable development, integrating the above-mentioned competencies.	

This is currently being investigated in research projects at NTNU. One can be critical of the strong focus on the three key competencies, the weighting of the competencies, and how this offers sufficient support to empower and engage students to work with sustainability. However, it is not realistic to expect one course to cover all nine competencies. Moreover, it is important to emphasize that this course is part of the overall curriculum for all Master's programs at the university and that one should take a holistic view on how competencies for SD are integrated within each of the separate study programs.

Student-Active Learning Methods

The EiT course combines different interactive, participative, and action-oriented teaching approaches. The main learning methods are project-based learning, experiential learning, reflection, and working with real-world challenges. These methods actively involve students in developing interdisciplinary teamwork skills, while simultaneously engaging them to contribute to complex challenges, in many cases, related to sustainability (more on this in "Knowledge on Various Sustainability Themes"). Several of these pedagogical methods are highly relevant for the operationalization of competencies related to collaboration and self-awareness (Wiek et al., 2015) and are carried forward in a study from Lozano and

Barreiro-Gen (2021) to support the development of interpersonal relations and collaboration skills.

EiT represents interdisciplinary project work at the Master's level in which both the interdisciplinary project work and the cooperative team process are focal points. The assignment should challenge each student within their area of expertise. Each student is responsible for the know-how from their own area of expertise and for contributing to the mutual problem-solving process. Through **project-based learning** the students are trained in interdisciplinary communication and in how to operate in an interdisciplinary environment. The teaching approach is also **experience based**. A key aspect of the learning process occurs when different situations arise across disciplines. Students develop collaborative teamwork skills by reflecting on these situations throughout the project. Team members perform **reflection** activities both as individuals and together as a team. These reflections are facilitated by teaching staff as well as with a variety of exercises that focus on writing reflections; giving and receiving feedback; and creating an environment where the students feel safe and secure to talk about the relationships within the team. Within the project work, the student teams define their own project based on relevant **real-world challenges** from civic and work life. Moreover, in many of the EiT classes, student teams are encouraged to cooperate with external partners. This kind of collaboration can support students to reflect on how their project is valuable to society. In addition, it offers inspiration and provides relevant knowledge, as well as presents the opportunity to discuss how the project can benefit others.

Knowledge on Various Sustainability Themes

The EiT course consists of more than 100 classes where the overall topic of each class is characterized by a broad theme related to societal or environmental issues, including challenges from work life. The overall topic requires engaging students from different subject areas, motivating them to work together, and forms the basis for a meaningful project defined by the student teams. There has been a steady increase in the number of classes where the academic staff have related the overall topic to a sustainability theme. In 2019, this was valid for more than half of the classes in the course. At the same time, based on the preferences received from the participating students, there is a clear tendency among students to prioritize classes with a sustainability-focused theme.

This development has happened without being explicitly called for by the Experts in Teamwork Academic Section, or any other unit at NTNU. Still, upon seeing this development, the Experts in Teamwork Academic Section has developed learning material to facilitate this evolution, both for the teaching staff and for the students. The learning materials are in the form of videos and exercises and are included in one of the teacher training modules (Sortland et al., 2021, p. 146).

Since 2018 NTNU has committed itself, strategically, to achieve the UN 17 SDGs. The SDGs are therefore now explicitly recommended as an appropriate theme in EiT (Sortland et al., 2021, p. 16) and may have had a significant influence on the EiT teaching staff in formulating the theme of their EiT classes. With their complex yet concrete formulations, the SDGs are especially suitable for interdisciplinary cooperation. Examples of class themes in 2022 are "Creating value from waste," "Climate-neutral, inclusive, beautiful & sustainable Nyhavna," and "Hydrogen in transportation for a safe and sustainable future."

All of the class themes are presented on a webpage before the beginning of the semester, and the students are allocated to their villages according to their preferences and the requirements of the classes for certain background competencies. About 90 per cent of the students are normally granted a place in a class they have chosen as their first or second priority. The classes may have external partners that relate to the theme, and these partners may act as users or recipients of the student work.

3 Experts in Teamwork as a Strategic Initiative for Sustainability in Higher Education

In this section, we describe how EiT is intertwined with sustainability strategies for education and research in the university. We also discuss strategic and practical challenges that arise when organizing a university-wide initiative like EiT. This includes the influence on the development of EiT by the COVID-19 pandemic.

Sustainability at NTNU

The NTNU vision of "knowledge for a better world" states that "*knowledge and technology development create opportunities for increasing sustainable value creation and finding answers to major challenges*," whereby the

university "*will contribute actively towards achieving the UN Sustainable Development Goals through its strength: our competency in science and technology combined with academic breadth and interdisciplinarity*" (NTNU Board, 2018). The university aims to fulfil this vision through its core tasks: education and learning environment, research, art, innovation, dissemination, and outreach. This whole university approach has been indicated as essential for embedding sustainability in HEI (Leal Filho et al., 2018).

Within the research context, this has led to NTNU strategic research areas 2014–2023: NTNU Health, NTNU Oceans, NTNU Sustainability, and NTNU Energy. Moreover, in the spring of 2021, an internal call for proposals was launched for research projects on *interdisciplinary research on sustainability*. This initiative emphasizes the need for a better systemic understanding related to transformative changes in society, which would require collaboration across disciplines and sectors. It has led to 9 interdisciplinary sustainability projects, involving up to 50 academic staff from all faculties at NTNU, and allows for 44 PhD candidates to contribute to these research projects.

Within the field of education, efforts were recently made in the form of two large projects "Future Technology Studies" (FTS) and "Future Humanities and Social Sciences Studies" (FHS) that ran from 2019 to 2021. The projects focused on how NTNU technological, humanities, and social sciences studies should be shaped in agreement with technological developments, societal challenges, and needs from business and work life from 2025 onwards (Fremtidens Teknologistudier, 2022, p. 3). The projects resulted in a description of needed competencies of NTNU future candidates, recommendations for how these can be operationalized into future studies at the university, and several pilot projects that tested out specific aspects that were raised in the projects. Both the FTS and FHS projects emphasize the importance of integrating key competencies for SD in all study programs at NTNU, as a basis for knowledge related to understanding and managing sustainability challenges. The projects adopt UNESCO's eight key competencies (Rieckmann, 2018a) in an adapted version for higher education (National Committee for Cooperation with Agenda 2030, 2020). This has led to the formulation of NTNU's vision for FTS to "*educate candidates who can and want to contribute to a better world and a sustainable future*" (Fremtidens Teknologistudier, 2022, p. 10). Collaborative competency and innovation are to be integrated at all levels of the education programs and include reflection on the

usefulness and ethical aspects of a project, as well as interdisciplinary collaboration across NTNU campuses.

The Faculty of Economics and Management functions at the intersection of technology, economics, and management. This combination makes it possible for it to become a key factor in societal development. The vision of the faculty is to be a united one built of "strong units" and "strong connections." The faculty aims to "create sustainable value, starting from first ideas towards implementing these to reach a better society," thereby emphasizing the importance of technological development (Economics and Management Faculty board, 2018). To strengthen its efforts towards sustainability, the faculty appointed a Vice-Dean for Sustainability in the summer of 2021. Up to now, this has led to concrete plans being created within research and education. For example, as part of the annual plan for 2022, the faculty will map how sustainability is currently integrated in all of its study programs. This is a first and important step in being able to strengthen sustainability in the educational portfolio of the faculty. Interdisciplinary collaboration is advanced as one of the selected priorities for the faculty for 2018–2025, with the goal to *develop students' skills in interdisciplinary teamwork through learning activities across subject areas and professions.*

EiT's Contribution to Sustainability

It is worth mentioning that interdisciplinary collaboration is called out explicitly on different strategic levels at the university: as a priority area in NTNUs and the strategy of the faculty for 2018–2025, as well as an important competency in the projects on future studies at the university (FTS and FHS). Both FTS and FHS state that interdisciplinary collaboration will be a competency that allows candidates to contribute actively and constructively to a sustainable future for Norway and the world.

The EiT course helps to fulfil the NTNU vision by providing a platform for student experience-based learning in ways that provide insight into the prerequisites for effective, innovative, and productive groups. Through its increasing size, its expected learning outcomes, and its joint training of teaching staff, EiT is constantly evolving while, at the same time, representing the largest educational project for NTNU. Through skills that promote collaboration competency through project work in teams, EiT helps students to utilize their disciplinary knowledge in interdisciplinary collaboration. This will improve the likelihood that they will find solutions

to complex issues. In this way, EiT provides an important contribution to fulfilling the NTNU vision of "Knowledge for a better world."

Research at the Experts in Teamwork Academic Section includes a focus on how interdisciplinary collaboration in projects can lead to increased sustainability and how it can support sustainable innovation (Nilsen, 2020). This is also happening as part of, and in cooperation with, the initiative of the university on interdisciplinary research on sustainability.

The EiT course has undergone continuous development since its inception, including extensions of and improvements to its teaching materials, in the form of written materials, online courses, and videos. It has also developed a teacher training which now targets more than 300 teaching staff yearly. Based on our expertise and experience, the Experts in Teamwork Academic Section is also involved in several educational development pilot initiatives within FTS and FHS: projects that focus on (a) connecting the aims and challenges of studies of the future (FTS and FHS) with a cluster of EiT classes that will gather ideas and proposals from a student perspective, (b) the integration of competencies for SD in technology study programs, and (c) the integration\\ of interdisciplinary collaboration skills within minors on sustainability and digitalization that will be at the Bachelor's level at the university.

So far, EiT is a compulsory course in all programs at the Master's level, but there is no equivalent at the Bachelor's level. The pilot offers the opportunity to test how collaborative competency can be integrated at the Bachelor's level. Moreover, interdisciplinary competency, as one of the key competencies for SD, is aimed at becoming integrated in all future studies at the university, including at the PhD level. The Experts in Teamwork Academic Section is coordinating the development of a future PhD course on interdisciplinary collaboration for sustainability, aimed, at first, at PhD candidates in the university initiative on interdisciplinary research on sustainability.

Growing attention for sustainability and competencies for SD, including interdisciplinary collaboration, on various strategic levels, helps to highlight the contribution that EiT can make to competency, knowledge, and pedagogy. EiT thereby contributes to three of the competencies for SD and a combination of student-active learning methods. Disciplinary knowledge on the other hand is provided by the teaching staff, who represent the different faculties and departments at the university. A growing number of sustainability themes in the different EiT classes demonstrate

an increase in focus on a variety of sustainability themes being taught in different study programs at the university.

Challenges Related to Organizing a University-Wide Initiative

In this section we highlight the strategic and practical challenges of organizing this university-wide educational initiative and the integration of sustainability. Instituting EiT represents considerable strategic, pedagogical, and organizational challenges.

The strategic challenges are, by and large, related to the fact that EiT is a mandatory university-wide course. This implies that discipline-specific programs on the Master's level cannot represent full-time study, as all Master's students have to spend 7.5 ECTS learning how to work across disciplines on sustainability. There are, of course, differing opinions among faculty as to whether this is the best allocation of time and resources.

The pedagogical challenges are related to establishing interdisciplinary problem areas for the assignments that serve to motivate and unite students across disciplinary borders, including establishing an interdisciplinary curriculum for the team process, selecting appropriate course reading material, and preparing the teaching staff (which changes from year to year).

The organizational challenges are related to organizing student teams across faculties and developing appropriate examinations. To accommodate part-time students, virtual classes have been developed where student teams only meet online. This also allows for mixing students across the three NTNU campus cities across Norway. In addition, COVID-19, and the resulting pandemic, has led to EiT becoming fully digital in periods of lock-down in Norway and at NTNU. This has had implications for pedagogy and has required a rapid development of hybrid learning environments. The Experts in Teamwork Academic Section has in the period of 2020–2022 developed an extensive toolbox for learners in the digital environment.

4 Moving Forward

We conclude this chapter by looking ahead to how sustainability can be strengthened further in the EiT course, in connection with other strategic initiatives at the university. We also look at how EiT, as an educational initiative, can become a source of inspiration for other HEIs that wish to

integrate sustainability by making a university-wide course part of their curriculum.

The recent evolutions related to sustainability in research and education at NTNU provide a strong basis for moving sustainability more to the forefront within the EiT course. This is made possible by showing how the course is already preparing students to be able to contribute to a sustainable future, while, at the same time, clarifying how it fits into the larger picture of future study programs; and by giving clear directions on which competencies for SD a study program should focus on, while also providing inspiration on how student-active pedagogical approaches can get operationalized. It is also critical to proceed with the ongoing dialogue on and development of future studies at the Bachelor's, Master's, and PhD levels, while focusing on how sustainability is integrated into different programs of study.

Collaboration with different networks provides opportunities for further development, inspiration, and the dissemination of similar initiatives both nationally and internationally. Shared efforts in the Nordic Experts in Teams network led to the further development of courses within the partner institutions, and the efforts also act as a source of inspiration for other HEIs that want to integrate similar course concepts across the globe.

The Experts in Teamwork Academic Section has also been one of the partners in Engage—the Centre for Engaged Education through Entrepreneurship, since 2017. Engage is one of the Norwegian Centres for Excellence in Education with a vision *to increase the number of students in Norway and around the world with entrepreneurial skills and the mindset to become change agents for the better*. Sustainable development is entrenched in this vision, in the projects of the Centre, and activities targeting students, educators, and researchers. The Centre provides adjacent perspectives and pedagogical approaches from the practice of entrepreneurship education that can be enriching for the further development of the EiT course. In the same way, partnerships offer an opportunity for reaching out to the larger range of HEIs worldwide.

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Best Teaching Practices in Environmental Sustainability Education: A Cross-Country Comparison

Diola Bijlhout, Teresa Vilaça, and Rebecca Chewitt-Lucas

1 Introduction

Various educators in Higher Education (HE) institutions (e.g., colleges and universities) are teaching or integrating elements of Environmental and Sustainability Education (ESD) in their teaching practices. The influence exerted by governments, civic society, NGOs, businesses, and

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international organizations shapes engagement with ESD teaching practices of educators in higher education within countries. Country- and region-specific environmental circumstances, as well as global circumstances such as the COVID-19 pandemic, are also driving forces that influence engagement with the ESD practices of HE educators and their institutions.

There is no blanket approach for teaching ESD in higher education, but important lessons can still be learned from individual countries for the benefit of others; best practices can be identified to support the training and development of educators in HE across countries. Our interdisciplinary research group (RDC) in Health, Environment, and Sustainability Education as part of the Association for Teacher Education in Europe (ATEE) conducted a comparative study in three countries: Barbados, Portugal, and the United Kingdom (UK). The selection of the three countries was made based on the existing collaboration between ESD researchers as part of the RDC. New collaborations were established following UNESCO ESD workshops (2020) and this topic germinated due to the observed differences in ESD teaching practices in HE across countries and regions. This chapter will discuss the highlights of this study and the key lessons learned for building ESD practices in HE that will benefit educators, students, and their societies more broadly.

2 Background

Barbados in the Context of Environmental and Sustainability Education (ESD)

The Small Island Developing State (SIDS) of Barbados has a population of approximately 285,744 and a land area of 430 sq. km (166 sq. mi). The World Bank Group (2022) measure of Sustainable Development Goals (SDGs) indicates an economic growth of 1.4% in 2021. Over the last 50 years, the government of Barbados has placed great emphasis on the country's education system, as reflected by a literacy rate above 90% (World Bank Group, 2022).

In an effort to implement the Barbados Sustainable Development Policy, the Ministry of Housing, Lands, and the Environment (2004) highlighted that the education system was to play a major role in the integration of ESD. Barbados's government and private sector have implemented initiatives to promote and achieve ESD through formal and non-formal education. A major initiative at that time was the Education

Sector Enhancement Programme. The core objectives of this program were to further develop the country's human resources to adapt to a changing global environment and to strengthen the teaching and learning process via the integration of educational technologies (Pirog & Kioko, 2010). Over the years, some primary and secondary schools have engaged in projects related to environmental education and sustainable development. However, these projects tend to be rather sporadic in nature. A more sustained effort is required if more significant gains are to be achieved. The present government is a strong advocate for sustainable development initiatives and recognizes the detrimental impact of climate change on SIDS.

In Barbados, HE is provided by both private and government institutions. Institutions of strong government influence and control include the Barbados Community College (BCC), the Samuel Jackman Prescod Institute of Technology (SJPI), the Barbados Vocational Training Board, the Erdiston Teachers' Training College (ETTC), and one regional campus of the University of the West Indies (UWI) (Ministry of Education, Technological, and Vocational Training, 2017). At present, UWI plays a leading role in promoting SDG 13 in collaboration with International Association of Universities' (IAU) Global Cluster on Higher Education and Research for Sustainable Development (HESD). Some of these initiatives are:

- Master's of Education in ESD, Global Citizenship, and Peace for teachers and educators
- Centre for Resource Management and Environmental Studies (CERMES)
- The Climate Studies Group Mona (CSGM)
- Institute for Sustainable Development (ISD) (Higher Education for Research for Sustainable Development, 2022)

In Barbados, the Erdiston Teachers' Training College has implemented an ESD module for professional development in all major teacher training programs offered by the college. The intention is to have teachers, of all subject areas, examine concepts related to ESD and to develop strategies for implementing ESD in schools. This program is designed to build capacity related to ESD. Erdiston Teachers' Training College is one of the 30 original members of the International Network of Teacher Education Institutions associated with UNESCO whose aim is to address how the

education of teachers could be reoriented to address the integration of sustainable development. In effect, this is an attempt to explore how education could play a more meaningful role in the attainment of the sustainable development goals. This organization is over 21 years old.

Climate change, and the threat it poses to lives and livelihoods in SIDS, such as Barbados, has become a major concern. ESD is critical in tackling this threat and that SDGs cannot be achieved unless education plays a major role in developing the appropriate knowledge, skills, and attitudes needed to combat this major issue.

Portugal in the Context of ESD

Higher education in Portugal is provided by autonomous universities and polytechnic schools. Public universities provide higher education degrees and courses in all professional areas and are geared toward scientific training, while polytechnic education is focused on courses geared toward vocational training or advanced technical training. Professional teaching qualifications are obtained by completing a master's degree (Decree Law no. 79/2014, 14 May, amended by Declaration of Rectification no. 32/2014, 27th June, as well as Decree Law no. 176/2014, 12th December, and no. 16/2018, 7th March). Master's degrees (second cycle) should also offer general educational training, specific didactics of the teaching profession, training in cultural, social, and ethical areas, and an introduction to professional practice that culminates with supervised practice.

To fully qualify with teaching status in pre-school education (early childhood education) as well as the first (from first to fourth grades) and second cycles (from fifth to sixth grades) of basic education, candidates first require a degree in basic education and a subsequent master's degree in education. These courses exist at universities and at polytechnic schools. To gain access to a master's degree course in education of the third cycle of basic education (from 7th to 9th grades) and secondary education (from 10th to 12th grades)—for example, a master's in biology and geology teaching in the third cycle of basic education and in secondary education—candidates must have a first degree and have completed between 120 and 180 ECTS following the European Credit Transfer and Accumulation System in a subject area or in each of the subject areas covered by the master's degree. These courses exist at universities. The teaching staff involved in initial teacher education courses in higher education

institutions should be duly qualified, hold a PhD, or be deemed a specialist of recognized experience and professional competence.

The key actors in decision-making processes who designed and implemented ESD in Portugal consider that there is a lack of commitment from governmental institutions to implement ESD at the university level and only a few documents are partially linked to sustainable development (Farinha et al., 2018). Nevertheless, they consider that Portuguese universities' autonomy and their social responsibility led them to develop several initiatives and policies toward ESD.

To investigate whether graduate and postgraduate studies in Portuguese public HE are aligned with the Sustainable Development Goals (SDGs), Aleixo et al. (2020) carried out a content analysis of the designations and objectives of the 2556 undergraduate and master's degrees courses in 33 Portuguese public higher education institutions. They found that 198 courses directly address at least one SDG; on average, each higher education institution has six courses that explicitly address at least one SDG. Moreover, they note that universities have more courses in SDG areas than polytechnics, more master's degrees embrace SDGs than undergraduate degrees, and most courses addressing SDGs are from the social sciences and humanities areas and from natural and environmental sciences.

The National Voluntary Report (RNV) on the Implementation of the 2030 Agenda (Ministério dos Negócios Estrangeiros, 2017), presented at the United Nations in 2017, established the national priorities, having defined six strategic SDGs: 4—Quality Education; 5—Gender Equality; 9—Industry, Innovation, and Infrastructure; 10—Reducing Inequalities; 13—Climate Action; and 14—Protecting Marine Life. Against this background, the inclusion of teacher educators of various subjects with a master's degree in early childhood education and teachers of the first, second, and third cycles of basic education and of secondary education is a pertinent intentional sample in the ambit of this global study.

The UK in the Context of ESD

The UK's HE sector has experienced the impacts of significant events, including Brexit, which threatens collaborations between European researchers, colleges, and universities, as well as the COVID-19 pandemic that caused severe disruptions, affecting students' learning and teaching practices. Approximately 2.7 million UK students were studying in colleges and universities in 2019–2020 (HESA, 2021). A diverse group of

teachers across disciplines in HE is engaged in ESD teaching with the aim to build graduates' understanding of and engagement with sustainability and by integrating it into their working lives (Appleton, 2017).

The relevance given to ESD in UK government policies fluctuated over time; the same picture emerges independently for the four integrated nations (Wales, Northern Ireland, England, and Scotland) (UNESCO, 2013; Department for Education [DfE], 2021). Following COP 26 and since the COVID pandemic, there appears to be a strategic turnaround in the UK government's re-engagement and commitment to climate, environment, and sustainability actions as part of a strategy that includes enhancing the methods of teaching best practices of ESD in higher education and engaging institutions in sustainability practices to reach the climate and sustainability goals set for 2030 (DfE, 2021).

The incorporation of ESD teaching practices in UK HE institutions has been facilitated and supported through the following approaches:

- HE institutions adopting a holistic, whole-institution approach to environmental sustainability to contribute toward the UN's SDGs (Appleton, 2017).
- A government-imposed code of practice in HE for teaching and learning that incorporates ESD; since 2021, college teacher graduates are required to have a strong understanding of sustainability and integrate this in their teaching (DfE, 2021).
- The Advance HE organization promotes excellence in sustainability education in HE institutions by sharing of knowledge, resources, and contributions toward developing ESD guidance and professional recognition for university teachers (Advance HE, 2021).
- The Environment Association for Universities and Colleges (EAUC) promotes sustainability in HE institutions by empowering institutions, sharing teaching advice and learning resources, and conducting research (EAUC, 2017).
- Various NGOs for educators, such as SEEd (Sustainability and Environmental Education) and TEESNet (Teacher Education for Equity and Sustainability Network), share teaching and learning resources and research (UNESCO, 2013; Appleton, 2017).

There are approximately 165 universities and HE institutions in the UK (HESA, 2021). A survey undertaken in universities, colleges, and student unions revealed 73% would favor mandatory action being taken by

the UK government to pressure senior management to prioritize the delivery of sustainability (EAUC, 2019). Although environmental and sustainability education is back on the political agenda, the existing complexities in facilitating ESD practice in higher education, in contrast to primary and secondary education, must be recognized. There is no one catch-all approach to teaching ESD in UK HE (Appleton, 2017).

3 Rational and Theoretical Framework

Within the above-mentioned three contexts, this study focuses on identifying the best ESD teaching practices across countries to support the training and development opportunities of educators in teaching ESD within HE institutions. Drawing on work by Cortese and Hattan (2010) and Christie et al. (2015), which both recognize the potential of teaching ESD if based on specific pedagogies and teaching methods and in integrated and holistic way, our study focuses on supporting educators in HE to identify their teaching practices. We understand that every ESD teaching practice is influenced by the specific educational context and the content that establishes learning and educational performance standards. However, practices can also evolve from more bottom-up approaches, such as close collaborations with students. In light of the ESD challenges in recent times, HE institutions need to be at the forefront in equipping future generations by promoting and contributing to sustainable practices in their societies (Christie et al., 2015; Glantz et al., 2008; Wals, 2010).

Pedagogy for Learning

We view environmental citizenship as a pedagogy that promotes ESD teaching practices that build students' knowledge and affect students' behaviors. The understanding is that the teaching of values and practices toward the achievement of sustainability will result in how students will behave in society (Martinho et al., 2010). This can range from solving current environmental problems to achieving sustainability as well as critical, active engagement and civic participation (Hadjichambis et al., 2020). The practices of environmental citizenship are based on student notions of participatory democracy, rights, responsibilities, and entitlements in promoting sustainability (Martinho et al., 2010).

As environmental citizens, students can undertake individual or collective actions in public or private contexts (Hadjichambis et al., 2020).

Other pedagogies, such as environmental literacies, have a narrow goal to enhance positive environmental attitudes in students, extending knowledge on what is needed for healthy and responsible relationships with nature (Hadjichambis et al., 2020). Within environmental citizenship, educators in HE are supported by various pedagogical approaches. For example, this includes place-based learning, problem-based learning, civic ecology education, action competence learning, and socio-scientific inquiry-based learning (Hadjichambis et al., 2020). An investigation of the environmental citizenship pedagogical approaches applied by educators, as well as how they affect student learning in HE, comprises the learning design of this study.

4 Methodology

We highlight data from three contexts within an exploratory, cross-country approach for cross-learning and knowledge-sharing opportunities toward the identification of best ESD practices in the training and development of educators in higher education. The study examines learning opportunities for educators in HE, the practices that would increase students' awareness concerning the environment, the role of sustainability approaches, how to better integrate subjects of environmental and sustainability education in practice as part of the curricula, and the differences and similarities in relation to ESD practices in and between countries. The ATEE Administrative Council encouraged and supported the members of the RDC in their academic work, including this study.

The Circularity of ESD Transformation

We use our "Circularity of ESD Transformation" model, which draws from the "Three Pillars of Sustainability Model" (Adams, 2006; Scott Cato, 2009; Purvis et al., 2019). The three circles represent the social, economic, and environmental aspects that are connected to sustainability (modeled as "Current" in Fig. 1). In our model, this interconnectedness of sustainability is reflected by a nation's response to economic, social, and environmental issues. The priority given by countries to their economies and their interaction with society at large following trade-offs and spillover effects impact the environment and are underlying explanatory factors for ESD practices implemented in HE (Scott Cato, 2009).

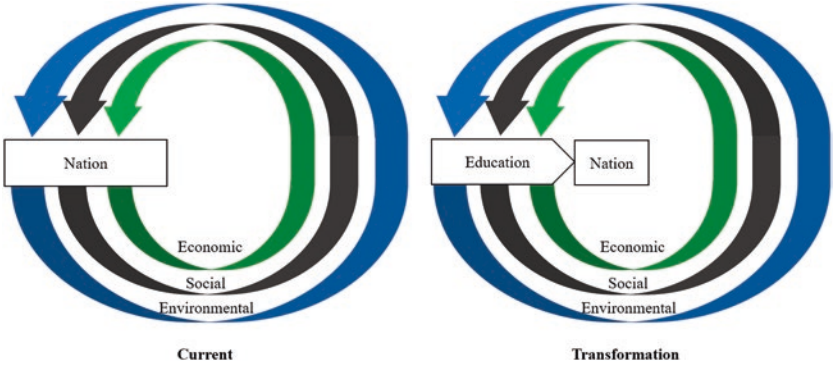

Fig. 1 The four pillars of the sustainability model ("Current" adapted from Adams, 2006)

Moreover, our model adds a fourth pillar, representing education, due to its relevance, as supported by our study (see "Transformation," Fig. 1). A nation's education system is influenced by and reflective of economic, social, and environmental matters, thus contributing to the presence or absence of sustainable practices. The circularity of ESD is reflected when a nation uses, and therefore transforms, its ESD to similarly influence and impact its sustainability practices in economic, social, and environmental spheres. This model provided researchers across countries an excellent framework for better understanding the ESD practices implemented by educators in HE and their institutions. Within this structure, educators in HE in specific countries identified their ESD practices and country-specific researchers made the connections with the four pillars of sustainability.

Participants

Executing this study during the COVID-19 pandemic proved challenging and impacted our research design. We used various channels to recruit participants, such as through convenience sampling, online and social media platforms, teacher organizations, and our networks. Participation in this type of survey-based research proved less motivating for teachers in HE during the COVID-19 pandemic, which is reflected by the small sample. More specifically, educators across HE institutions were requested to participate by country-based researchers that were part of the interdisciplinary research group of the Association for Teacher Education in Europe

(ATEE). The country-based researchers, tapping into their established networks, reached out to colleges, universities, and individual educators in Barbados, Portugal, and the UK; the call to participate in our study, however, was open to all educators.

Study Research Method: Online Questionnaire

We use descriptive analysis as the method to describe the features of the samples. The research group developed one ESD online questionnaire for educators and trainee educators in HE. For the validation of the online questionnaire, the collaboration of experienced Health, Environment, and Sustainability Education RDC researchers of each country was requested to translate and produce a local version of the instrument. The initial questionnaire was written in English and consisted of 14 items. In order to determine whether the questionnaire could be applied in each country or if items required adaptation, a country expert was consulted to give evidence-based or theory-driven suggestions for the national adaptation of the instrument. The first part of the online questionnaire provides information about the aims of the study, the ethics, the method, and the amount of survey completion time and asked for participant-informed consent.

The questionnaire used a five-point-based Likert scale. The types of questions used allowed participants to select a response indicating a time period, varying from "never" to "always;" for example, *how often did you teach about the following themes/problems of education for sustainable development in the last 12 months at the school where you worked?* Another set of questions asked about the need for development to which the participant could select a response indicating levels of need, varying from "no need" to "high level of need": for example, *for each of the areas listed below, what is the degree to which you need to develop your knowledge/competences regarding education for sustainable development?* These questions were complemented by open-ended questions, through which in-depth details were provided.

The questionnaire was accessible on and was uploaded to the online Survey Monkey platform from which the data was collected. Data collection took place over a one-year time frame, to allow for the establishment of networks within and across countries between researchers and educators. Our analysis focuses on identifying the ESD practices across countries that were implemented or that were absent, as well as on connections with the four pillars of sustainability.

5 Findings

The recruitment of teachers in colleges and universities across the disciplines that integrate ESD proved challenging; as a result, a small sample group of teachers were recruited across countries. We recognize that this aspect could impact the overall applicability of the findings. The findings of this study, despite its small sample size, remain relevant as it was carried out by experienced researchers and educators, who also have teacher training experience, with access to unique networks of educators working at the intersection of three fields. We believe these first findings might inspire other researchers to further expand the evidence-based practice of ESD teaching. Describing these findings will continue to support ESD discourses in HE institutions and teachers across nations.

Barbados Findings

The findings are based on reports from two Barbadian female teachers. Both teachers were aged between 31 and 40 years and reported having acquired formal education by obtaining a post-graduate degree (PhD). The Barbadian context relied on convenience sampling and, as a result, a limited number of teachers in HE responsible for ESD teaching could be recruited as participants. In addition, the ongoing COVID-19 pandemic proved to be a challenging time period to motivate teachers in HE for this study. The areas of the degrees awarded were in Languages and Humanities and Social Studies; the age of students taught ranged from 16 to 20 years.

According to a single teacher, the institution made changes following the COVID-19 pandemic. The following practices were part of the changes: students being exposed to information, were being provided with examples for solutions, and were encouraged to protect the environment. How these practices were facilitated in teaching was not detailed by the teacher. One teacher defined ESD as "maintaining natural resources without harm, while still meeting the developmental needs of society as present." The key global environmental problems reported by one teacher centered on climate change, pollution, ecological issues, and COVID-19. The key local environmental problems, similarly, were linked to climate change and COVID-19 but also indicated violence as a key local environmental problem. The teacher continued to explain, "It is about the practice of formally sensiti[z]ing persons about the ways in which a country can help to maintain itself and improve people's quality of living. By

extension, the world at large is impacted positively." Addressing violence in this context as part of ESD teaching contributes to this sensitizing practice.

The frequency of the themes and problems relating to ESD being taught is an interesting indicator, and the following becomes apparent: certain theme clusters and problems related to ESD were reported as being taught seldom, sometimes, often, or always. Themes that centered on mobility were reported by a single teacher as rarely taught. Furthermore, themes that centered on culture and cultural diversity, human rights, business environmental practices, sustainable (energy) consumption, and air and atmosphere were reported to have been taught sometimes during that academic year (2020–2021) by a single teacher. The themes that were reported as often being taught (2020–2021) by a single teacher were reflective of current local and global challenges and centered on human health, conservation of nature and biodiversity, climate change, water, and waste management. Two themes were reported by a single teacher as always being part of teaching during the academic year, namely gender equality and peace/human security.

A single teacher indicated the approaches[1] that were often used to teach the identified themes and problems in ESD within the last 12 months.

[1] **Context-based teaching** strategy involves teaching concepts, ideas, and principles by using real-life contexts to connect to students' lives in the real world. **Cooperative group discussion-based learning** involves methods, such as Fishbowl and Jigsaw, to stimulate peer group discussion skills and the comprehension of complicated ideas or texts. **Debate/dialectic-based teaching** involves stimulating collaboration between students to critically think about and discuss propositions to complicated world issues, thereby enhancing students' application of critical examination, questioning, and self-reflection skills. **Demonstration** involves methods where teachers'/students' communication of ideas, concepts, and complicated topics are supported by, for example, graphs, flip charts, whiteboards /blackboards, and PowerPoint, to enhance understanding and to make connections to practical world issues. **Guided discovery or exploratory teaching** involves using methods for solving problems by using active participation from students in exploring and discovering new knowledge. **Peer education** involves using methods based on student partnerships, such as peer support, peer assessments, or discussion seminars, through which students help one another in building understanding and knowledge. **Action-based teaching** is a teaching methodology contributing to solve societal problems, that is, a whole student approach focusing on what teachers and learners do and say while engaged in meaningful learning activities. **Project-based teaching** involves giving students opportunities to study a challenging problem, engage in sustained inquiry, find answers to authentic questions, help choose the project, reflect on the process, critique and revise the work, and create a public product. **Co-creation-based teaching** involves a process by which students collaborate with teachers in a participatory design of their own learning experiences.

These approaches included context-based learning, project-based teaching, lecture-based teaching, online and technology-based teaching, teachable moments, and storytelling-based teaching. Furthermore, other approaches such as action-based learning, debate-based learning, demonstration, cooperative group discussion-based learning, co-creation-based teaching, guided discovery, and peer-based teaching were reported as being used sometimes by a single teacher. A single teacher reported never visiting places of educational interest or using experiential-based teaching approaches in the last 12 months. Neither of the teachers indicated having a need for further development in knowledge and competence in ESD.

Portugal Findings

The findings are based on reports from a group of 15 teachers, 9 women (n=9) and 6 men (n=6). The majority were aged between 51 and 60 years of age and had obtained a post-graduate study (PhD) in Science Education.

The majority of the teachers reported that their institutions had not changed their practice to get an overview of local and global environmental problems following the COVID-19 pandemic. Nonetheless, teachers reported six key global and local environmental problems that needed to be addressed at the HE institution. Teachers indicated problems on a global level involving climate change, urban solid waste, the COVID-19 pandemic, lack of water, loss of biodiversity, and pollution, followed by a small number of teachers who mentioned the depletion of non-renewable natural resources, decreasing quality of life, global warming, and natural risks. On the local level, the majority of teachers reported the same principal six problems, giving priority to the COVID-19 pandemic and urban solid waste. A smaller number of teachers also mentioned the local problems of the depletion of non-renewable natural resources, decreasing quality of life, global warming and natural risks, and soil degradation.

The frequency of the themes and problems relating to ESD that were being taught in the last 12 months in higher education reveal the themes of conservation of nature and biodiversity, climate change, and waste

management were for one teacher “always” and for another “often” part of the teachers’ teaching. The themes and problems that were sometimes taught by most teachers included human rights, human health, business environmental practices, sustainable energy consumption, and mobility. Furthermore, the themes and problems that were seldom or never taught by the majority of teachers include cultural diversity and intercultural understanding, peace and human security, gender equality, conservation of cultural heritage, economical solutions to poverty reduction, sustainable consumption, water risk, and air and atmosphere pollution.

When teaching these ESD-related themes, most teachers reported often or always using the following approaches: context-based teaching, action-based teaching, project-based teaching, debate and dialectic teaching, teachable moments, online and technological-based teaching, and peer education. The majority of teachers reported sometimes using guided discovery and exploratory teaching, and experiential based-teaching. While most teachers also reported never or seldom using approaches such as co-creation-based teaching, cooperative group discussion, storytelling-based teaching outdoor activities or visits to places of educational interests, lecture-based teaching, and demonstration approaches.

The majority of teachers reported no need or a low need to develop knowledge and competence in areas such as environmental education and ESD, eco-schools/green schools, knowledge about the institution’s management and administration, national guidelines of ESD, assessing school policies and practices related to ESD, the development of research-based learning in ESD, and the collection of data and reflection of other teachers on practices of ESD. However, they reported moderate needs regarding interdisciplinary sustainability-related themes or problems and the Municipal Educational Project.

In the same way, most teachers reported not having or having a low degree of need to develop their knowledge and skills in relation to the inclusion of ESD in the subjects that they teach in higher education institutions. More specifically, during teacher internships, there is a lack of teacher training on how to include and explore ESD goals in the curriculum of their specific subjects, as well as on planning, evaluating, monitoring, and communicating school- or class-based ESD. Similarly, most teachers have the required knowledge and skills to explore interests, talents, passions, and natural curiosities of students considering their initial knowledge. This allows teachers to strategize on how to implement experiential learning both in and outside of the classroom, on how to make

information and skills relevant to student real-life situations, and on how to teach students to use digital technologies purposefully to create, develop, and share their projects. This would also include how to develop project-based learning designed to address real-world problems and issues. However, the majority of teachers reported a moderate to high need to develop knowledge and competence related to teaching ESD to students with special needs and teaching ESD in a multicultural setting.

UK Findings

The findings are based on the reports of four UK teachers, of which two were male and two were female. Teachers were teaching in colleges and in universities. Two teachers had obtained a doctoral qualification, one teacher had obtained a master's degree, and another a bachelor's degree. The area of the degree awarded included the Sciences, Humanities and Social Studies, and Teacher Education. Two teachers reported being between 41 and 50 years old, one reported being between 31 and 40 years old, and one reported being older than 60 years. The age of students taught ranged from 16 years to 25 years and above 25 years.

One teacher reported the HE institution changed its practices following the COVID-19 pandemic. The practice of increased virtual meetings was indicated as the change. ESD was defined by teachers in three areas, namely (1) SDG-related modules, (2) the health and well-being of students and staff for effective teaching and learning, and (3) holistic education combining mind, body, and feelings in enhancing personal development and knowledge; ESD was also referred to as "holistic teaching." The key themes and global environmental problems reported by some teachers centered on greenhouse emission, air travel, food waste, food packaging, and water bottles. A single teacher linked key themes and global environmental problems across educational sectors and highlighted a lack of awareness of history, recurring processes, and a need for cross-curricular integration to promote student awareness of the impact of their actions on the environment. The key themes and local environmental problems reported by some teachers equally centered on food packing, re-cycling but not tokenism (which was unfortunately not further elaborated), the impact of travel to and from school, and all aspects of waste.

The frequency of the themes and problems relating to ESD that were being taught in the last 12 months differed between some teachers. For instance, the following themes were reported as often being taught by

one, while another reported having seldom, sometimes, or never taught the following themes: cultural diversity and intercultural understanding, human rights, peace and human security, gender equality, human health, business environmental practices, conservation of nature and biodiversity, sustainable consumption, sustainable energy consumption, climate change, waste management, and water. This difference in the frequency with which ESD-related problems and themes were taught was observed between a single teacher in the field of Science and Humanities. It is plausible that the diversity of teachers across the disciplines in HE highlights a stronger focus on themes that are closely linked to their subject specialism. As a result, we are able to develop an understanding of how the education of graduates with regard to ESD is shaped in HE.

To teach these ESD-related themes, a single teacher reported always using context-based teaching, action-based teaching, project-based teaching, and lecture-based teaching approaches. Furthermore, two teachers reported often using demonstration as an approach in teaching. A single teacher reported often having used specific approaches, while a single teacher reported never having used the same approaches in the last 12 months, namely co-creation-based teaching, cooperative group discussion-based teaching, and online and technology-based teaching. In addition, some teachers reported sometimes using guided discovery and exploratory teaching, peer-based teaching, and outdoor activities while visiting places of educational interest, storytelling-based teaching, and utilizing teachable moment approaches seldom were used.

A single teacher indicated a high level of need in developing competence and knowledge in specific areas, while another teacher reported a low level of need in the same areas, namely ESD and environmental education, eco-schools and green schools, ESD in the specific teaching subject, interdisciplinary sustainability-related themes, national guidelines of ESD, municipal educational project, national program and curriculum goals, planning and school/class-based ESD and exploring the interests, talents, passions, and natural curiosities of students.

In addition, a moderate level of need was associated to developing competence and knowledge by a single teacher in the areas of student behavior and group of student management, school management and administration, the assessing of school policies and ESD practices, establishing effective communication, planning and monitoring of ESD, evaluating and monitoring of school/class-based ESD project, teaching ESD to students with special needs, teaching ESD in a multicultural setting, and

exploring ESD in specific teaching subject. Similarly, a moderate level of need was indicated with respect to developing research-based ESD teaching and understanding, implementing experiential learning in and outside the classroom, making information and skills relevant for real-life situations, using technology purposefully to share projects, developing project-based learning that addresses real-world problems, collecting data, and reflecting on practices of health education with colleagues.

6 Key Lessons for Building ESD Practices: A Discussion across Three Countries

In this exploratory cross-country study, despite the limitations of the study associated with the type of sample in each country, five key learning lessons for building EDS practices in higher education emerge. The first lesson is that ecocentric and anthropocentric conceptions of the environment and sustainable development that are common among teachers of primary, secondary, and university education in several countries (e.g., Castéra & Clément, 2016; Kopnina, 2020; Nyberg et al., 2020) did not emerge in higher education teachers of the three countries participating in this study. This is very positive for the training of future professionals within the framework of the 2030 Agenda (UNESCO, 2020) and is further supported by the sustainability model that we advocate in this study (Purvis et al., 2019). The holistic view of the environment and sustainable development that emerged from these participants, both in their understanding of these concepts and in the themes they worked on in the subjects that they teach in higher education, shows a simultaneous concern for the environmental, social, and economic dimensions of sustainability as well as their interrelationships; this concern has been advocated as a priority for the formation of empowered environmental citizenship to promote sustainable development (Dada et al., 2017). Evidence of this holistic concept is, for example, the simultaneous work on topics such as cultural diversity and intercultural understanding of human rights within the topics of climate change or waste management that were mentioned by respondents in the three countries as being sometimes or often included by teachers in the subjects they teach in higher education.

The second lesson is that both global and local problems are considered a priority by participants in the three countries; climate change and the COVID-19 pandemic are the major current concerns on a global scale in

terms of research (Brumann et al., 2022; Chao et al., 2021; Eilam, 2022; Guidry et al., 2022), public policies (e.g., Lazard & Youngs, 2021; World Health Organization, 2022), and education (Dadaczynski et al., 2020). Urban solid waste is a major global and local environmental problem acknowledged by Portuguese and UK respondent teachers, whereas pollution was a main concern for respondent teachers in Barbados and Portugal. It is worth noting the different local environmental problems in the three countries; violence emerged as one of the priorities for Barbados, soil degradation for Portugal, and greenhouse emission for the UK.

The third lesson is that teachers from Barbados and Portugal often addressed the conservation of nature and biodiversity, climate change, waste management, and sometimes social problems in their classes in the last 12 months, giving a clear priority to environmental problems. However, UK teachers created a greater balance between social and environmental problems. On the one hand, they sometimes taught topics such as cultural diversity and intercultural understanding, human rights, peace and human security, gender equality, and human health. On the other hand, with regard to environmental problems, topics such as business environmental practices, conservation of nature and biodiversity, sustainable consumption, climate change, waste management, and water issues are also taught.

The fourth lesson is that the approaches often used by respondents from the three countries working in higher education contexts with ESD practices in their classes are contextualized and inquiry-based, such as action-oriented and project-based teaching; the use of online and technological-based teaching was also popular. These methodologies, like co-creation-based teaching, have proven to be very effective in ESD (Barreto & Vilaça, 2018, 2019; Vilaça et al., 2019a, 2019b). However, the latter is only rarely or sometimes used in the three countries, so it is necessary to encourage and train teachers in its use in ESD contexts.

The fifth and final lesson is related to higher education teacher professional development in ESD. Most teachers in the three countries showed no need or a moderate need to develop their knowledge and competences in relation to ESD. Moreover, in all countries, High Education teachers only showed a moderate to high need for training to teach ESD to students with special needs and in multicultural settings.

Despite the limitations of the study, our findings have important implications for the mission and objectives of our interdisciplinary research group in Health, Environment, and Sustainability Education as part of the

Association for Teacher Education in Europe (ATEE). First, the RDC strives to create learning opportunities for educators in ESD for applied practices that increase students' awareness concerning health, the environment, and their links to sustainability approaches. Second, it is necessary to encourage further reflection as an RDC on how to better achieve the integration of subjects related to environmental and sustainability education in practice as part of the curricula in HE. Third, it is important to continue to deepen our understanding of differences and similarities in relation to ESD practices in HE locally, in between countries, and globally to influence contextually sensitive policies toward the greater goal of sustainability.

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The Future of Hybrid Learning Models and Sustainable Education in the Post-Pandemic Era

Jagriti Mishra and Kruti Dholakia

1 Introduction

In the 1840s, Sir Isaac Pitman began using blended learning methods in one of the first distance learning programs, teaching shorthand to his students via postcards. In return, students sent back assignments for grading and evaluation (Harting & Erthal, 2005). Though this process did not involve the Internet or mobile phones, it involved student assessment-related feedback shared with the learners via distance, both of which are integral components of modern-day blended learning and

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computer-based learning (Pappas, 2015). A notable example of one of the first computer-based training programs is Plato, developed in 1963 by Control Data and the University of Illinois to deploy training modules to multiple employees at once without offline contact with the instructor. More than 100 years since Pitman's shorthand course, distance education transitioned from parcel post, to radio, to television, and, finally, to the Internet (Kentnor, 2015). It was not until 1998 that the first generation of web-based instruction came into existence. Since the 2000s, the concept of blended learning has gained importance and the associated teaching methodology has become increasingly interactive with the integration of webinars, online tutorials, and so on (BakarNordin & Alias, 2013). Educators and learners both now have a wide range of technological tools and applications at their disposal. This educational climate proved essential with the global outbreak of the COVID-19 pandemic when lockdowns forced institutional shutdowns and e-learning became a dominant teaching method in numerous countries. In many developing regions, however, there is a lack of accessibility to the infrastructure necessary for online learning. Still, the connections that are provided by the Internet and the advancement of technology does mean that learning became possible and efficient even if the teacher and student are based in different locations.

This chapter analyzes case studies from the fields of psychology, technology, business, and education and places them in conversation, showing that a broader understanding of the impact blended/hybrid learning has (and could have in the future) on society is required when considering educational design. Not only is this beneficial for higher education institutions and their students, but accessible education can also have a great impact on sociological development. Through a multidisciplinary survey of existing literature and interviews with several educators, we forecast that although e-learning has become an integral part of the current educational climate, hybrid learning is the educational direction of the future. As a result, higher education institutions must commit to continuing to adopt necessary technologies and design new pedagogical approaches to ensure its successful implementation. Through this commitment, these institutions will be contributing to the accomplishment of seven of the Sustainable Development Goals (SDGs) put forth by the United Nations as part of the 2030 Agenda.

In Sect. 2, we define blended and hybrid learning. Section 3 highlights the growth of the e-learning industry and the impact it has had on learning. In Sect. 4, we explain why a blended and hybrid approach is beneficial

for students, and Sect. 5 looks at its future. Section 6 shows how the benefits of this approach extend to the accomplishment of the SDGs. In Sect. 7, we explore the intersection of accessibility and sustainable education. Finally, in Sect. 8, we provide a cursory look at the future of education post-pandemic before providing concluding remarks.

As a part of the study, interviews were conducted with Dr. John Walsh, Director of the English Language Program at the International College, Krirk University; Senior Lecturer Narentheren Kaliappen of Universiti Utara Malaysia, Malaysia; Professor A.K. Khare, Director of the National Institute of Fashion Technology (NIFT), Gandhinagar, Gujarat, India; and Dr. Anupama Pasricha, Chair and Professor of Fashion and Sustainability Studies of the Department of Fashion Design and Merchandising at St. Catherine University, Minnesota, USA, to gather insights on the present and future of sustainability in education.

2 Blended Learning and Hybrid Learning

Merging traditional and virtual approaches, blended learning is simply defined by Halil Ibrahim Akyüz and Serap Samsa (2009) as "learning which combines online and face-to-face approaches." Like these authors, we use blended learning and hybrid learning somewhat interchangeably, but more recent publications point out how confusing the terminology associated with these learning approaches is in addition to the blurring of their definitions (Bozkurt, 2022). In this chapter, we use blended learning as per the definition above, meaning that the courses are designed to use both online self-learning components and face-to-face instruction. Since the pandemic, the lines between the definitions of blended and hybrid learning have blurred even more. In many places, hybrid learning has come to define a course which is taught live—both in-person and online—at the same time giving students the option as to how to attend. This was particularly useful in overcoming the obstacles put forth by the pandemic in terms of restrictions on gathering. In this chapter, hybrid learning refers to courses taught live by human instructors that are accessible both in-person and via the Internet, but not necessarily with a live element. Our focus is on the way that blended learning and hybrid learning combines mixed teaching methods (Procter, 2003). Our research shows that combining the two to design courses that offer students a choice is the future of educational design, and so the blurring of the two is appropriate here.

A common approach to blended learning and hybrid learning is known as flexible learning, in which the instructor provides the study material and

instructions to students online and the lessons are self-guided. However, the instructor or teacher is available on-site or via videoconferencing. Here, the student has the independence to control their consumption and interaction with the course in a digital environment, as well as through direct contact with the teacher.

3 The Growth of E-learning

Hybrid learning has been made possible by the advancement of digital technologies which, now more than ever, play a crucial role in teaching and education (Herath & Herath, 2020). The effectiveness of education-related technology in supporting meaningful teaching and learning is totally dependent on how engaged the educators and learners are in their development, implementation, and use (Sangra & Bates, 2011).

While the pandemic may have been a key driver of the implementation of online teaching methods, education technology pre-pandemic was already beginning to grow, with global EdTech investments amounting to US$18.66 billion in 2019 (Li & Lalani, 2020). There has been a significant surge in the use of online learning tools since the beginning of the COVID-19 pandemic, whether it be language apps, virtual tutoring, video conferencing tools, or other online learning software. With these EdTech platforms, teaching is no longer restricted to the boundaries of geography. Learners can now access materials from all over the world, which can usually be reviewed as many times as needed, thanks to the digitally recorded nature of most of the available materials. Institutions offering higher education had already begun to implement e-learning elements years earlier.

In 2001, the annual reports of four Czech Republic universities (Czech Technical University, Prague; VŠB-Technical University of Ostrava; University of Economics, Prague; Institute of Chemical Technology, Prague (VŠCHT)) mentioned implementing e-learning in various forms such as building e-libraries, training academic staff on e-learning technologies, incorporating ICT (information and communication technology) into courses, and preparing study material for part-time learners (Cerna,2013). These universities were later joined by the Czech University of Life Sciences in Prague, the Technical University of Liberec and Mendel University in Brno in the year 2002. Since 2003, other institutions such as the Brno University of Technology, the College of Polytechnics in Jihlava, and the College of Technology and Economics in České Budějovice have also joined.

In 2020, the global EdTech market size was valued at US$89.49 billion and the market is expected to grow at a compound annual growth rate of 19.9% from 2021 to 2028 to reach US$ 377.85 billion by 2028 (Next Generation Technologies, 2021). Learning has become a massive industry, indicating a global interest in acquiring knowledge and skills via a variety of mediums. EdTech platforms apply technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), Augmented Reality (AR), and Virtual Reality (VR) to learning that is not limited to academic institutions. The integration of AR and VR in EdTech solutions helps offer an interactive experience to the learners, whereas blockchain technology allows end users to store and secure user data, enabling data-driven decisions.

The success of EdTech companies such as BYJU's, Blackboard Inc., Chegg Inc., Coursera Inc., Edutech, edX Inc., and Google LLC provides a glimpse into the growth potential of the sector. While these have focused on school-level education and test prep, other models are yet to be explored fully (Cheema, 2020). Some platforms, such as Testbook, target government job aspirants and offer preparation tests. Retail giant Amazon also realized the potential of this market segment and developed Amazon Academy, which focuses on preparation for entrance exams to professional educational programs. In the corporate world, Los Angeles-based company In-Stride targets firms, enabling them to provide career-boosting degrees and credentials to their employees through leading global academic institutions (Builtin, 2022).

The focus of EdTech startups is not limited to end users; some also cater to businesses. For instance, India's Classplus, founded in 2018, helps coaching institutes, tuition centers, and private tutors take traditional offline class management setups and move them online with a mobile-first product. SkoolApp is a school management software that offers features effective for communication and administration, including video streaming, integration of camera systems, payment portal, and tracking alerts. All of these platforms facilitated the integration of offline education systems to online delivery during the pandemic. However, governments in some countries feel there is a need to regulate such platforms by developing a code of conduct for ensuring complete transparency in education (Agarwal & Mishra, 2022).

4 A Combined Blended/Hybrid Approach

While e-learning has made blended and hybrid learning possible, bringing in the advantage of connectivity over distance, it also introduces multiple challenges, including cognitive load to the learner, inaccessibility, and ineffectiveness in terms of delivery of practical modules, among others. In a recent study, Professor Jeremy Bailenson, founding director of the Stanford Virtual Human Interaction Lab (VHIL), examined the psychological consequences of prolonged exposure to online platforms (Ramachandran, 2021). In his research, he explored "Zoom Fatigue" and found that it has four main causes: the intensity of constant close-up eye contact, constantly seeing one's reflection, the reduction of mobility, and the increased cognitive load required for communication on these platforms.

Online classes also trigger anxiety and depression issues for many students due to isolation and lack of socialization. A study at a Lebanese university shows that the sudden shift to exclusive e-learning methods of instruction caused anxiety and depression symptoms among a significant portion of students (Fawaz & Samaha, 2021). A blended and hybrid learning approach allows the learner to vary the methods through which they consume and engage with the course, which may help alleviate some of the detrimental effects sometimes seen in online-only courses.

Additionally, online-only courses are often ineffective in delivering subjects that require practical inputs. In an interview, Dr. John Walsh, Director of the English Language Program at the International College, Krirk University, says that delivering online lectures for practical demonstration-based subjects is exceptionally tricky, whereas certain subjects, such as languages, can easily be well taught through AI-driven tools; hence, the effectiveness of online teaching can vary from subject to subject (Walsh, 2021). He further states that other factors such as session duration also greatly impact the productivity of online lectures. In an interview conducted by the authors, Heli, 23, a Marine Engineering student, states that online models were not particularly effective for learning subjects that require practical inputs. She stated that face-to-face direct interactive sessions with teachers are far more effective. This is why a combined blended and hybrid approach needs to be considered and developed for successful and effective learning.

Moreover, this combined approach may also prove constructive when addressing issues of accessibility and student motivation. In the interview

with Dr. Walsh, he points out that online classes exclude many students who do not have access to a suitable learning environment. He recounts his experiences teaching in Hanoi, Vietnam, where large family size is the cultural norm and students do not have access to separate rooms to attend classes. He states that although 90% of households in Vietnam have access to the Internet, families sometimes have a single Internet connection working on a single mobile device, which is not suitable for attending online classes, thereby creating a digital divide (Walsh, 2021). By combining in-person and blended and hybrid learning approaches and offering a variety of ways for students to engage with the course, learners are given the opportunity to customize their learning experience to their circumstances.

The way that students are given control over their learning experience must also be carefully designed. Existing literature shows that the amount of discipline required from the learner can be a disadvantage to some students. As most online courses are primarily self-regulated and a certain level of autonomy is offered, it is requisite on the learner's part to exert a higher level of self-control in their education. For example, a 2020 study about the challenges of the online component of blended learning shows that students are required to overcome isolation and the dearth of spontaneous interaction online which can cause procrastination and stress (Rasheed et al., 2020). The authors also highlight that a lack of adequate training and technology available to teachers needs to be addressed if a blended teaching method is to work efficiently and effectively. With this pedagogical approach growing more popular, these issues will need to be addressed by both higher education institutions and the EdTech software being used.

5 Hybrid and Blended Learning: Tools of the Future

In a detailed discussion, Professor A.K. Khare, Director of the National Institute of Fashion Technology (NIFT), Gandhinagar, Gujarat, shared several insights regarding the future of education. He stated that "creative systems will need to deal with the complexity of who our students are" (Khare, 2021). He also stresses it would become increasingly important to understand how education will be sought and eventually transacted in an environment where "unpredictability" is a given. We may, therefore, need

to look at an "informed direction" versus an "applied direction" as an approach. Resources, therefore, would have a new meaning. He further states, "What is available as a directory of resources today may not exist at all by then, or may exist in another form. This could be the twilight of formal education." He also claims that the informal sector is bound to gain prominence, where various EdTech service providers such as Coursera and Udemy may become increasingly popular. Manav Subodh, co-founder of 1M1B (1 Million for 1 Billion), a UN-accredited non-profit organization, explains that in the next five to ten years, the Metaverse and its application in education is going to be impactful in India. According to him, Metaverse in education can solve various problems like lack of infrastructure, teacher shortages, access, and inclusion issues, and students dropping out of the formal education system (Tripathi, 2022). Teaching and learning may become primarily AI-driven with AR, VR, and ER becoming popular delivery techniques. Though smart classrooms already exist in some locations, they are quickly becoming standard teaching tools.

The formal education sector is predicted to witness a major change in terms of personalized learning in which the "pick and choose" model becomes a more popular choice, providing a high degree of flexibility to students, enabling them to choose their own learning paths (Cunningham, 2022). Personalized learning for higher education is not implausible, wherein individual curricula may be designed and/or curriculum will be co-created by the student and the faculty/service provider. Educational design for elementary school has shown to be a successful way to design curricula that allows for individual choice (Griffin, 2018). Moreover, as the informal sector gains in popularity in terms of the preferred mode of education, an array of certifications is beginning to be expected to give greater flexibility to learners. Learning is expected to become experiential, with VR and holographic learning predominating, along with robot teachers, where there will be a human-robot co-teaching and the role of human educators may transform into one of mentorship (Abendschein et al., 2021). However, human-robot co-teaching, like hybrid and blended learning, still involves direct student contact with their teacher. Citing a 2001 study, Abu BakarNordin and Norlidah Alias (2013) argue the importance of this, as it is not the technology itself that students learn from, but the teacher-implemented strategies engaged with via online platforms. This combination of human teachers and technology may also help alleviate language barriers to education, allowing more students to access courses and instructors from around the world.

Dr. Khare further suggests that with the advent of the Metaverse, lectures being delivered in virtual classrooms is a not-so-distant reality and on-the-go learning may gain traction along with Neural Learning and Crowd Learning (Khare, 2021). Neural learning occurs via artificial neural networks (ANNs) and allows information/knowledge transfer from one or multiple person/entities to another like Bluetooth downloads. Crowd learning allows students to source their educational demands and learning takes place through a network of sources making it multi-modal akin to current-day crowdsourcing (Padhariya & Raichura, 2014). CrowdLearn is an incentive-based learning and teaching platform that encourages experts to share their knowledge and to incentivize them for their contributions. The future might see the advent of "learning on the go" where learners actively learn as they go about their daily lives (Jones, 2017). In other words, learning is slotted in during spare moments, like during travel, while waiting for a friend or public transport to arrive, or maybe during a break at work. These shifts in learning are important for higher education to note, as their existing models will also need to adapt. Through adopting a well-implemented hybrid and blended approach to the learning environment that has emerged from the COVID-19 pandemic, higher education institutions will also be part of an education system that contributes to global sustainability.

6 Hybrid Learning and the SDGs

Sustainability is all about longevity; something that can be supported over a long period of time using processes that do not cause excessive waste is sustainable. Another important facet is that sustainable endeavors must lead to the betterment of the environment, including the social and economic environments (Sterling & Orr, 2001). With great potential to have a positive impact on the socio-economic, the continued incorporation and betterment of hybrid and blended learning in higher education will help contribute to achieving seven of the 17 SDGs as per the 2030 Agenda.

At its core, sustainable education incorporates three tenets: people, processes, and the environment. With respect to designing and using green systems in education, SDG 4, per the United Nations, states that a sustainable education system must "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (United

Nations, 2022).[1] In their most recent SDG progress report, the UN estimates "that 147 million children missed more than half of their in-person instruction over the past two years" which could mean, they say, that the generation of children learning during the pandemic "could lose a combined total of $17 trillion in lifetime earnings (in current value)" (United Nations, 2022, p. 34). These students are the ones that will be considering higher education in the next decade.

Without access to adequate technology for remote learning, this has been especially devastating for disadvantaged groups, especially those living in rural areas. Smartpur Project, supported by Nokia, is one of the best examples of an approach to resolve the issue of accessibility to educational institutes and a lack of digital or electronic devices in rural homes in India (Digital Empowerment Foundation, 2021). The initiative aims to offer various vocational education courses through an online medium to girls and youth more broadly. Moreover, this approach highlights a gliding path that higher education can be looked up for inspiration in designing a pedagogical future in a sustainable way.

The Smartpur Project also aims to improve the health, livelihood, governance, finance, and entertainment value of its users. By creating communal facilities in villages that offer better connectivity to the outer world, the Smartpur Project allows villagers to participate in a global network. This aligns directly with SDG 17, which aims to strengthen global partnership to achieve more of the 2030 Agenda. This globalized connection can help communities overcome the issues faced in local occupations. Moreover, teaching digital literacy means that education can have a wider reach and is a huge step toward attaining SDG 4 in providing "equitable and inclusive quality education and life-long learning opportunities for all" (United Nations, 2022).

In a country like India, where many adolescent girls have to drop out of school due to the limited number of schools in the area where they live, e-learning or hybrid learning could be instrumental in facilitating education. Ensuring education is accessible, especially for girls, can help fulfill SDG 5 which aims to "achieve gender equality and empower all women and girls" (Save the Children, 2022). It has been shown that educating women in rural areas leads to healthier families, and increases hygiene in the household, which further impacts village, district, and state hygiene

[1] For a complete list and description of each SDG, please see The Sustainable Development Goals Report 2022.

levels (Gaoshan, 2014). This ultimately increases well-being. In developing countries especially, this may help achieve SDG 3's goal of ensuring good health and well-being.

On a broader scale, the implementation of blended and hybrid learning by institutes of higher education, in expanding access to learning, would allow for education, vocational training, and entrepreneurship to be better networked through technology. This has the potential to result in the growth of employment for all and economic growth, contributing to the achievement of SDG 8, which in turn, contributes to attaining SDG 1 and SDG 2—ending poverty and hunger. Like Smartpur, such initiatives would also lessen migration from rural to urban areas, which will further contribute to solving the issue of overpopulated urban areas and the overstressing of resources toward maintaining a better ecological balance.

7 Sustainable Education and Accessibility

A segment of educators and experts feel that hybrid and e-learning accelerate sustainable development by providing access to education opportunities to those who otherwise may have limited time or resources. Dr. Anupama Pasricha, Chair and Professor of Fashion and Sustainability Studies of the Department of Fashion Design and Merchandising at St. Catherine University, Minnesota, USA, stated in an interview that although she agrees that hybrid and e-learning could accelerate sustainable development by providing access to individuals, the access to such methods is limited to people who can afford appropriate technologies, which excludes many marginalized communities (Pasricha, 2021). This issue could be resolved if access and delivery models were adjusted. "Sustainable development has to happen at the grassroots level where the marginalized communities are the key beneficiaries and stakeholders," Pasricha states. As EdTech players like Simplilearn, BYJU's, and Coursera become increasingly popular, some researchers claim that informal education is the future (Meraj, 2022). Professor Pasricha, however, disagrees. She feels that this system might be helpful for mature individuals to keep themselves updated, but such informal models might not work for all audiences. These models were applicable during unprecedented times such as the COVID-19 pandemic, but may not be suited to formal learning. She emphasizes that "education happens not only by reading and exploring but also through further critical reflection, interaction with diverse perspectives, and feedback loops which can only occur in formal

settings with more accountability and feasibility." When questioned about the role of robot teachers and neural learning in future in comparison to human interaction, Professor Pasricha states, "[I]n my mind, the role of educators was always teaching, learning, and mentoring. I think the sense of human connection and belonging is an essential human need that robots or neural learning cannot fulfil. Robots and neural platforms could be good tools for facilitating teaching, learning, and mentoring" (Pasricha, 2021). This is why a hybrid approach will be the way forward, blending the need for teachers and mentors with digital learning tools.

With e-learning quickly making itself a staple in pedagogy, educational institutions are gearing up to embrace hybrid models and lay grounds for long-term decision-making. When asked about the effectiveness of online learning vis-à-vis hybrid and face-to-face learning, Professor Pasricha states that it will vary with variations in demographics, access, course pedagogy, and content. She further says that "it is expected that online learning/hybrid learning will have long term effects in institutions, such as changes in long term decision making and financial decisions as well as courses, infrastructure, etc. A lot of long-term effects, some known and some unexpected, are expected to change space and technology/infrastructure needs" (Pasricha, 2021). Hence it can be inferred that major changes are likely, when it comes to technological and infrastructural requirements of educational institutes in the future.

In an interview, Senior Lecturer Narentheren Kaliappen of Universiti Utara Malaysia, Malaysia, stated that demographics, particularly age, significantly impact the acceptance of online learning (Narentheran, 2021). Educators in elderly age groups seem to be more inclined toward learning face-to-face, whereas their younger counterparts are comparatively more open to online learning. Kaliappen also claims that hybrid learning is the future as this is how education can be made more inclusive. In our conversation with Dr. John Walsh mentioned earlier, he also agrees with putting some modules within a program online and teaching some in-person, so that the same college premise can accommodate more students, thereby increasing accessibility to education. At the same time, hybrid modes or online modes of teaching could be helpful to students who were unable to join physical classes due to certain limitations.

With more and more students returning to physical classrooms after spending considerable time in online classrooms, hybrid classrooms are growing in popularity. However, teaching pedagogy needs refinement in order to ensure effective delivery through this mode of learning. Kaliappen

points out that hybrid learning is the future, but we must equip ourselves to combat the challenges this new form of teaching poses. Hybrid modes of learning present opportunities for students who want to attend course lectures without the limitation of being present physically in a classroom setting. With respect to hybrid learning, institutions must focus on aspects such as pedagogy, technology, and curriculum development. A lot of research is required to specifically develop pedagogy that suits the requirements for hybrid teaching and learning in an effective manner. Technology will play a key role, and specially designed smart classrooms will be a major requirement for implementing hybrid teaching. This may create connections between academic institutions with technology firms. It is also important that the curriculum be designed to suit the requirements of all students, whether they are sitting face-to-face or attending sessions online. Kaliappen also discusses sustainability aspects of the education system. With the aftermath of the pandemic becoming the new normal and reality of the present, a hybrid method of teaching appears sustainable because it is something that can be continued whether or not COVID-19 cases are peaking. Several universities have already included Massive Open Online Courses (MOCCs) as a part of their offerings, which are expected to play a key role in both online and hybrid teaching. Narentheren suggests that EdTech platforms may be useful for professional skill-based learning, but they will not be able to uproot formal learning methods (Narentheran, 2021). Some of the deterrents with respect to these platforms are the efficacy of the examination system, their lack of proper mentoring and continuous evaluation, and control over the quality of course delivery.

Professor Youmin Xi, Executive President of Xi'an Jiaotong-Liverpool University (XJTLU), while addressing an expert panel at the QS Higher Ed Summit: China in 2022, explained, "[I]n early 2020, we moved all our courses from on-site to online. At that time, we had around 400 modules, and it only took us two weeks to expand our facility … because we have a good digital infrastructure" (Han, 2022). He also mentions that hybrid learning is futuristic, saying, "[H]ybrid education will be the future because online and on-site learning both have their own comparative advantages. We need to combine the two to find the best, potential value for students." In order to make education more accessible and flexible for all students, XJTLU set up a "Learning Mall," an online–onsite education platform in May 2020, allowing students multiple ways of accessing their education (Han, 2022). Hence, it can be inferred that in future, flexible education methods would be of key importance.

8 Envisioning the Future of Education

Several researchers insist that hybrid learning is the future, but institutions need to be fully equipped with the appropriate technology to ensure effective delivery (CRDE, 2021), including virtual walls that are integrated with strategically placed moving cameras that give educators increased mobility and agility. In the current hybrid learning design, educators face multiple issues while conducting classes in hybrid mode, including classroom and behavior management. Hybrid teaching methods have also led to increased workload, especially for educators, both before and after lectures. It is a given that the faculty members must multitask as they have to cater to the requirements of students present virtually and in person. Additionally, much time is also spent on troubleshooting for technical issues. When a segment of class is attending online and another segment is present in classrooms, it becomes very difficult for teachers to engage both groups effectively. Students have the option to choose between physical and online classes and it can become challenging to retain students for in-person activities. Hybrid learning may not ensure meaningful professional development training, and online learning has an inherent disadvantage of isolating the learner from his/her counterparts, which is very difficult to overcome. The only way this problem can be combated is by building a hybrid educational system that functions through pedagogical communities, using interactive shared knowledge approaches within course design. It must also be ensured that technology entrapment caused by overuse of applications or the lack of technical know-how is avoided. In order to achieve this, one must prioritize pedagogy over technology.

9 Conclusion

As the current educational environment adapts to new modes of learning, it is important to move to a student-centered model where experiences can be created through a variety of sources, both online and offline. Though there are flaws with the current hybrid model, its potential to be designed and implemented effectively within higher education could impact the role of these institutions in society. Through our analysis of case studies and our discussions with professional educators, we find that a blended learning approach that emphasizes student choice is a very successful educational method that, though already gaining popularity with the growth of the educational technology market prior to the beginning

of the COVID-19 pandemic, has become a popular learning choice. Moreover, the implementation of blended/hybrid learning in higher education has the enormous potential to contribute to the attainment of at least eight of the Sustainable Development Goals set out in the United Nations 2030 Agenda for Sustainable Development. However, if higher education institutes remain slow in adopting the necessary technologies, they may miss out on this opportunity to expand while tech giants dominate the market.

Though educational institutions would have to undoubtedly bear an additional load to upgrade their technological infrastructure, increased accessibility would increase student enrollment, therefore resulting in more tuition being paid. Due to increasing preference and the rise in number of hybrid courses offered, the number of students accessing campus at the same time would reduce, which could decrease the number of physical classrooms that are needed, electricity costs, and so on. This shift would lead to low comparative expense and high profit while contributing to the SDGs. On a policy level, incorporating EdTech platforms to cater to disadvantaged people at a subsidized rate or through a sponsorship system would help overcome the issues faced by large populations in developing countries. Such collaborations may certainly lead to social and community sustainability through education.

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PART II

On-Campus Sustainability Training

Education for Sustainable Development as Part of the Initial Training of Teachers in the UK

Douglas Bourn and Nese Soysal

1 Introduction

Training teachers has been seen as one of the best ways to embed Education for Sustainable Development (ESD) within the educational system. However, despite calls to re-orientate education towards sustainable development, progress in many countries has been slow. There have been notable exceptions, such as in Scotland, Sweden, and some provinces in Canada. All too often, however, themes of sustainability have been seen as just another body of knowledge that needs to be included (often in the

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natural sciences) and not as an opportunity to re-think the social purpose of education or to promote different pedagogical approaches (Scoffham, 2013; Swedish Council for Higher Education, 2021; Vaughter et al., 2016). Education for Sustainable Development, by definition, poses questions about the purpose of education and how subjects and themes should be taught.

This chapter aims to address these issues by focusing on how initial teacher education (ITE) has responded to the need to address sustainable development, by reviewing policies and practices in the United Kingdom (UK), with a particular focus on opportunities and obstacles within one university. The chapter addresses the enthusiastic participation of teacher educators and the extent to which teacher education programs are constrained by national curriculum priorities. It concludes by recognizing that, increasingly, the demand for greater inclusion of sustainability themes within initial teacher training programs has come not from teachers or administrators, but from students themselves, and that the enhanced profile of sustainability, and particularly climate change, has been driven largely by the wider society.

2 Education for Sustainable Development as Part of International Policies and Research

The concept of Education for Sustainable Development (ESD), or related terms such as education for sustainability, sustainable learning, or sustainable education, has, over the past two decades, become an important part of international educational policymaking, research, and practice. This growth in international interest has been helped considerably by the UN Decade on Education for Sustainable Development from 2005 to 2014 (Chalkey et al., 2010; Firth & Smith, 2017).

Since then, UNESCO has continued to promote sustainable development (alongside global citizenship and quality education), as one of the three main elements of its education strategy. The Sustainable Development Goals, particularly Target 4.7, have also helped to keep sustainability at the top of UNESCO's educational agenda:

> By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global

> citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development. (UNDP, 2016)

Alongside these international commitments, there has been a growing body of research on the ways in which ESD is being increasingly mentioned within teacher education research. This includes recent literature which indicates a growth in the integration of ESD into education programs (Murillo-Vargas et al., 2021). There have been numerous studies that indicate the growth of ESD in the primary curriculum (Álvarez et al., 2019; Cebrián & Junyent, 2015; Martínez et al., 2020, Muñoz et al., 2020). There have also been studies that have been conducted on undergraduate (Akça, 2019; Manasia et al., 2020; Soysal & Ok, 2022) and postgraduate programs (Ortega et al., 2020; Varetska et al., 2019) that have focused on research on sustainability competencies of students or student teachers.

Several studies indicate that student teachers show positive attitudes towards sustainable development (Akça, 2019; Andersson et al., 2013; Cebrián & Junyent, 2015; Soysal & Ok, 2021). Additionally, other studies demonstrate the influence that the perceptions of teachers and ESD competencies have on the preparation of students for the future (Anyolo et al., 2018; Bulut & Çakmak, 2018; Pegalajar-Palomino et al., 2021).

The incorporation of ESD into teacher education is also highlighted in broader research studies. ESD is recognized as a key factor for training responsible citizens (Albareda et al., 2018). Higher education is also considered as key to training prospective teachers to aid in transforming society (Bourn & Soysal, 2021; Cortese, 2003; Leal Filho, 2011; Pegalajar-Palomino et al., 2021). The UNESCO report, "Progress in ESD and Education for Global Citizenship," also emphasizes the importance of ESD in teacher education for the creation of sustainable societies (2018). However, the findings of this report indicate that the integration of ESD into global pre-service and in-service teacher education programs are insufficient (UNESCO, 2018).

While studies highlight the importance of developing a training course for ESD integration and its positive effects on teachers (Andersson et al., 2013; Merritt et al., 2019; Solís et al., 2019; Vega et al., 2015), a study by Dahl (2019) on seven teacher-education programs in Europe indicated that student teachers felt less prepared to teach sustainable development through add-on ESD courses. As a result, Dahl emphasized the importance of developing an integrated model for ESD in initial teacher

education (ITE) programs, focusing on course content, values, and ethics, as well as the pedagogy and didactics of the programs.

As teacher education programs in Europe increasingly focused on teaching about sustainable development, Solís et al. (2019) emphasized the importance of the reorientation of teacher education programs in order to integrate ESD into the curricula. García et al. (2020) indicated the shortcomings of a content based ESD approach, stating that teachers are knowledgeable about sustainable development, but there is an increasing need for a focus on teaching strategies for ESD in higher education.

There is some evidence that this focus is gaining recognition. Evans and Ferreira (2020) indicated the importance of sustainability pedagogies in teaching the topics of sustainability such as climate change, bio-diversity loss, and social inequality. The need to consider ESD as a distinctive pedagogy is evidenced in a variety of studies. This suggests that traditional approaches to education, such as lecturing and demonstrations, limit the capacity of individuals to think and act sustainably (Segalàs et al., 2010; Sterling, 2012). There is, therefore, a need to consider more transformative approaches, such as active learning, participatory education, and experiential learning in teaching sustainability (Bourn & Soysal, 2021). An example of this has been Sipos et al.'s (2008) "Head, Hands and Hearth" approach which brings together all the cognitive, behavioural, and affective domains to create transformative learning experiences through the use of role-playing, simulations, case studies, and critical reading activities.

There are a number of studies that have reported the integration of ESD into higher education in different countries (Azman et al., 2010; Blass et al., 2010; Milutinović & Nikolić, 2014; Vaughter et al., 2016). For instance, in Australia, the national curriculum from Preparatory Year to Year 10 aims to help students live more sustainably, and furthermore, sustainability is recognized as a strategic priority (Evans et al., 2021). In teacher education, service learning is considered as a way to promote multicultural and inclusive pedagogies and a way to help students understand social justice issues (Boyle-Baise, 1998; Evans et al., 2021). While some universities have a sustainability framework and sustainability and social research groups, there are other universities that align their mission, values, and strategic objectives with sustainability objectives.

In Sweden, ESD is a part of government policy with the aim that sustainability is integrated into all levels of education. For Initial Teacher

Education (ITE), ESD is among the qualification descriptors in the Qualifications Ordinance of the Swedish Higher Education Act and all universities are responsible for promoting ESD (Swedish Council for Higher Education, 2021).

A similar goal can be seen in Scotland where, since curriculum reforms in 2005, Learning for Sustainability (LfS), has been a major feature of the ITE curriculum. There is, however, some debate as to whether sustainability is still seen as an add-on rather than being fully embedded in the curriculum (Nicol et al., 2019, p. 27, as cited in Evans et al., 2021).

In Ireland, there is a focus on the environmental, economic, and social dimensions of sustainability in both research and in teaching. Pre-service teachers explore the concepts of education, diversity, and social justice in the Professional Graduate Diploma in Education (PDGE) curriculum (Evans et al., 2021). In Canada, there is an ESD policy for K-12 education in some provinces. As for ITE, there are some regional studies led by teacher educators and in accordance with the UNESCO Chair on Reorienting Teacher Education for Sustainability (Evans et al., 2021). Canadian universities and other higher education institutions are working on embedding sustainability into their planning frameworks; however, these are mostly limited to environmental mandates (Aikens et al., 2016; Vaughter et al., 2016 as cited in Franco et al., 2018). It has also been documented that, while there is a focus in America, Asia, and the Pacific on integrating ESD into the curriculum, Europe has focused more on environmental aspects of ESD. In Africa, social sustainability is perceived as the major priority in higher education (Franco et al., 2018).

A review of policies and research has shown that there are significant differences and debates about the extent to which ESD policy and practice has been implemented in higher education institutions. What is still underresearched is the extent to which there is an alignment of policy, curriculum, and practice within the global sustainability agenda (Franco et al., 2018). There are also other areas which need further research. These include: sustainability in a wide variety of disciplines, the limited training available that is designed to promote sustainability integration into the curriculum, the lack of a collaborative approach for students and teachers to become involved in sustainability issues, lack of content, and insufficient time (Barth & Rieckmann, 2015; Franco et al., 2018). What the evidence suggests is that in many countries, there is a lack of effective collaboration among key stakeholders towards common strategic goals. There is also a need to identify the extent to which policies and initiatives

should be driven by governments in response to demands by teachers and students. England provides a good context in which to explore and assess some of these challenges and issues.

3 Research on Initial Teacher Education in the UK

A study by Perry et al. (2019) that researched initial teacher education (ITE) in the UK suggested:

> Published research with any explicit discussion of the curriculum for initial teacher education proved hard to find. Much of the research in initial teacher education covers issues such as the balance of theory and practice; the roles of universities, schools, and mentors; the professional practices and identities of initial teacher educators; and the impact of adherence or otherwise to professional standards.

Further, they suggested that where there was some research on the ITE curriculum, it tended to focus on negative points such as failings and missed opportunities. Other studies have also noted the negative external factors that influence ITE, such as an over-emphasis on standards, assessment, effectiveness, and accountability (Philpott, 2014). In England, compared to the rest of the UK, there has also been an emphasis on subject-based knowledge (Field, 2012).

Researchers and academics engaged in teacher education have suggested that, in addition to subject-based knowledge and skills to deal with behaviour and assessment, student teachers need to know about pedagogical approaches to teaching their own subjects (Murray & Kosnik, 2011). Bourn (2012) emphasized the potential of some subjects like science, religious education, foreign languages, and mathematics to integrate global dimensions and ESD-related themes, skills, and values. There is also a need, he said, to make a distinction between subject knowledge and pedagogical subject knowledge for the integration of global learning and sustainable development into each subject. It is important to recognize global learning and sustainable development as a pedagogical approach for the construction and application of knowledge within a subject, in order to integrate different perspectives and critical reflections.

According to the Sustainability Skills Survey (NUS, 2016), there is a high demand among UK students for having ESD-related content in their

courses at universities. As universities in the UK operate in a competitive environment, the needs of students are prioritized and courses are developed accordingly (Fiselier et al., 2017). Another trend in higher education institutions in the UK is the People and Planet University League table that encourages universities to focus on ESD in their curricula (Fiselier et al., 2017). In this way, each university is allowed to choose its own method to integrate ESD into their programs. Many universities provide undergraduate training and some teach postgraduate courses in ESD. There are also some universities that provide co-curricular and extra-curricular activities which focus on ESD.

Studies on institutions in the UK that integrate ESD into the curriculum document several approaches (Fiselier et al., 2017). While some of them have a top-down approach that requires all of the programs to integrate ESD into their curriculum, there are others that leave this matter to the discretion of academicians. Barth and Timm (2011) call out the types of integration as "the inclusion of sustainability related topics to courses, adoption of new learning approaches, development of independent courses and integration of ESD into existing curriculum" (as cited in Fiselier et al., 2017, p. 396).

There are some barriers to the integration of ESD into the curriculum, such as how to engage staff in ESD, a lack of information about sustainability concepts and environmental issues, or how to link ESD with their disciplines. Staff might also find working across disciplines difficult (Thomas, 2004, as cited in Fiselier et al., 2017). On the other hand, there are success factors, including institution-wide people support, high-level institutional support and funding, QAA (Quality Assurance Agency), and HEA (Higher Education Academy) guidance supporting ESD commitment (Fiselier et al., 2017). Indicators of success include the active engagement of staff, the use of curriculum materials, and the field of ESD being recognized strategically across the university with appropriate funding and research resources provided (Cotton, 2006; de la Harpe & Thomas, 2009; Fiselier et al., 2017).

4 Changing Views of and Support for ESD Within Education in the UK

Education for sustainable development was recognized as a cross-curricular theme in schools before 2010, with appreciable interest and support of teacher educators. This encouraged teacher educators to further promote

and support teacher education aimed at bringing broader social purposes to education. Numerous initiatives were undertaken by the Labour government of the time, including the Sustainable Development Education Panel policy initiatives, the Sustainable Schools Programme, and a series of publications published by the Department of Education, the Qualifications and Curriculum Authority (QCA), and the Office for Standards in Education, Children's Services and Skills (OFSTED). While many actively engaged teacher educators were enthusiastic about these initiatives, the process of integrating them was rather top-down, and little consideration was given to upskilling the profession of teachers and teacher educators. One of the few teacher educator resources produced was a series of online courses and models of good practice, but their impact was minimal as they only became available after the change of government in 2010 which had a very different view of ESD within the curriculum (Bourn et al., 2017).

A comprehensive study was conducted by the UK Teacher Education Network for Education for Sustainable Development and Global Citizenship (TEESNet) regarding the approach of teacher educators to ESD and Global Citizenship (ESDGC) in their courses. The aim of the study was to establish the pattern of teacher education provision for ESD and global citizenship across the UK. As a result, it was found that there were different ways of covering ESDGC across and within institutions. In particular, they found that ESD was not being embedded into the individual programs. For that reason, it was recommended to incorporate comprehensive ESDGC into teacher education programs (Hunt et al., 2011).

The report indicated the ways in which ESD is covered in ITE programs across the UK:

- ESD was understood in different ways within ITE institutions and within the individuals in an institution. Also, regarding the definition and use of ESD, coherence between institutions was limited.
- ESD was covered in a variety of ways in different institutions. Mostly, it was not embedded into the institutional provision, but instead was included in only a few subjects, mostly sciences and geography.
- There was a lack of comprehensive co-ordination of ESD within many ITE institutions. ESD was often ad-hoc or driven by individuals with limited support. External support and funding encouraged better integration and more coordinated approaches to ESD.

- Most ITE institutions received the support of external bodies, such as NGOs, on ESD for teaching sessions and in providing resources. Most providers did not cooperate with other ITE providers in the provision of ESD, nor did they have strong international links around ESD.
- The barriers most cited in the integration of ESD into ITE were a lack of time and of funding, limited staff involvement, and a lack of tutor expertise.

Hunt and McGough (2012) provided support for teacher educators to embed global dimensions and sustainable development in postgraduate courses. They presented models of integration, related pedagogy, and resources to teacher educators; they also provided subject-specific guidance with detailed examples and specific resources for ESD.

In 2014, the steering group of the TEESNet published a report presenting case studies on how to bring ESD into the curriculum in different subject areas and an audit for evaluating ESD in teacher education, in order to guide teacher educators and student teachers in how to embed ESD into the teacher education curriculum (Belgeonne et al., 2014).

Since 2014, there have been few policy documents on ESD, but in 2021, Advance Higher Education (Advance HE) and QAA published a document titled "ESD Development Guidance" for the purpose of guiding UK higher education institutions in incorporating ESD into their curriculum and emphasizing the importance of the role of the higher education sector in addressing sustainability issues. They made ESD a part of strategic priorities and policies, integrating ESD into existing courses or validating new courses; making ESD central to staff and student induction processes; articulating ESD within quality improvement processes; and emphasizing staff development to support ESD (Advanced Higher Education, 2021). With the help of academic experts and business and student committees, they aimed to provide students with "the skills necessary to develop values and take actions to transition society towards a sustainable future" giving help in curriculum design and teaching, learning and assessment approaches (Advanced Higher Education, 2021).

Finally, in November 2021, in response to the growing demands to raise the profile of sustainability within schools, the Department for Education published a draft strategy that, while highlighting climate

change, also proposed that teachers and schools cover these areas in their curriculum. The focus of this strategy is, however, on climate education within the natural sciences and an emphasis on knowledge and facts (DFE, 2021). The strategy also makes no reference to sustainability being part of the core framework for teacher training.

5 Example of Engagement with Sustainability in a University Teacher Education Program in the UK

The initial training of teachers in the UK is heavily regulated and the spaces and opportunities to introduce broader social themes into courses is limited. This is due in part to the limited amount of time teacher educators have with student teachers outside of classroom observations, and the influence of a subject-based curriculum. This has meant that bringing sustainability themes into the classroom, apart from within subjects such as the natural sciences or geography, has been limited. A consequence of this has been that there have been more references to sustainability themes either in undergraduate education programs or as one-off activities within specific courses (Bourn & Soysal, 2021).

One university in London, however, has aimed to address these challenges by developing a strategy that aims to bring sustainability themes across a range of courses. This has included debates on environmental justice, encouraging inter-disciplinary initiatives between subject tutors, and linking initial teacher training to an ongoing program of professional development. In addition, optional initiatives, such as a free online course on sustainable development, are being planned. A feature of these initiatives was the desire to move beyond seeing sustainable development as just a body of knowledge to seeing it as a way of encouraging debate among student teachers about the whole purpose of their profession and its relationship to societal needs. A specific example of this was a course for all student teachers that directly addressed the concerns of the Black Lives Matters movement, and in which the concept of environmental justice was introduced. The course outlined themes such as the linkages between discrimination, social conditions, and the environment. Evidence from this one institution suggested that there was more space and opportunity for ESD within the initial training of primary school teachers than there was for the training of secondary teachers in that primary school education is

less focused on subjects. For example, the team responsible for training initial primary school teachers established a special online platform covering what teachers can do both in the classroom and outside of it with a particular focus on climate justice.

Other initiatives for initial secondary school teachers included demonstrating ways in which sustainability themes are relevant to all subject areas—in the arts as well as the sciences. A particular focus here was to develop a mentoring scheme for beginning teachers in response to the challenges they may encounter in the classroom and the extent to which sustainable development can be seen as a complex issue.

Another example of the way in which ESD can be seen as more than an additional body of knowledge is the way in which the ESD is being addressed within the institution in the initial training of Religious Education student teachers. While this subject area has more flexibility in terms of content than, say, geography and the natural sciences, courses have consciously linked sustainability themes to spiritual matters, considering how different religions regard the environment and the earth. One specific way this has been done has been through the use of the Earth Charter, an initiative that has the support of UNESCO and which aims to bring together the themes of the environment, development, human rights, and peace.

6 Securing Change Within Teacher Education Bodies

These examples suggest that, despite the obstacles that might exist, there is a desire on the part of many teacher educators and students to not only give higher prominence to sustainable development within teacher education courses but also provide an opportunity to re-think its aims and purposes. This interest is supported and encouraged by the literature and research in the field. The following suggestions point to how much more can be done to promote sustainability themes within teacher education.

First, the *motivation and enthusiasm* of teacher educators and teachers need to be better utilized. Numerous studies have demonstrated the value and importance of compassion for teachers and teacher educators, belief in social justice, and support for the environment (Birdsall, 2013; Borg et al., 2014; Burmeister & Eilks, 2013; Corney & Reid, 2007; Jaspar, 2008; Jones et al., 2008; Nikel, 2007; Summers et al., 2003; Ull et al., 2014; Yang et al., 2010). Individual efforts can often have a limited impact,

reflected in specific modules and courses, unless they are related to broader institutional support (Montemurro et al., 2014, in Canada; Wisely et al., 2010, in Scotland; Scoffham, 2013, in England).

Related to the points above is ensuring that there are ways to address *competing priorities*. Teacher education has always been faced with the challenge of a very crowded curriculum, and themes such as ESD all too often end up in the margins or as optional extras of a programme. This means that leadership from within the institution is necessary to prioritize ESD as essential to the training of teachers.

In order to take forward the engagement in ESD, there needs to be space within the teacher education curriculum to consider distinctive *pedagogical approaches*. There is an inevitable tension within ESD over what should be the main elements of the approach to teaching and learning. Some educators have emphasized explicit knowledge and close attention to use of textbooks (Bajaj, 2012; Darling-Hammond & Liebermann, 2012; Griffin, 2012; Kithuka, 2015); others have suggested a more transformative approach to learning (Bourn & Soysal, 2021; McKeown & Hopkins, 2010; Sterling, 2001).

There is a need for debates about ESD to more directly address the international policy initiatives around *skills and competencies*. The focus on teacher competencies has become an increasingly influential part of the discourse, including within a number of new initiatives in Europe and North America (Barth et al., 2007; Besong & Holland, 2015; Sims & Falkenberg, 2013; Lasen et al., 2015; Mischo, 2015; Soysal & Ok, 2022; Varga et al., 2007).

There is a need for institutions to *support teacher educators to undertake research and gather evidence from their own courses* on how ESD might become an integral component of their teaching and learning. For instance, the study of Firth and Winter (2007) indicated how Post Graduate Certificate of Education (PGCE) student teachers could be trained about sustainable development in geography courses in the UK. Ferreira et al. (2007) studied professional development models of sustainable development in initial teacher education in Australia indicating that initial teacher training is a strategic opportunity for the teaching of sustainable development. These examples could easily be replicated across universities elsewhere.

Finally, there is a need for teacher education institutions to recognize the *value of extracurricular activities* as part of the learning process around ESD. Poeck et al. (2019) suggest that if we want our students to understand sustainability problems deeply and to find solutions to these

problems, ESD should be designed beyond traditional schooling practices in order to include learning about problems of local sustainability and demonstrating the social relevance of teaching and learning.

Moving ESD forward within teacher education thus poses some bigger questions about the purpose and role of education in general, the motivations and enthusiasms of both teacher educators and the student teachers, and the external forces that can influence change.

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Engagement Strategies for Faculty and Staff Who Teach and Advise Sustainability Activists

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1 Introduction

In this chapter, members of the Student Affairs Administrators in Higher Education (NASPA) and of the Sustainability Knowledge Community (SKC) analyze and reflect upon the ways sustainability activism intersects with higher education sustainability practices, policies, and governance. The authors summarize relevant research about campus activism, the interests of college students, and student development across the college

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experience in order to be able to provide tangible recommendations for faculty and staff who advise and teach student sustainability activists.

The challenges of social equity, the environment, and economics often intersect with those of free speech, expression, and politics. Although these topics have recently been impacted by rapidly evolving social movements and the COVID-19 pandemic, they are not new to higher education institutions. Many higher education institutions are acting to address a variety of interconnected environmental, social, and economic issues that have been referred to as "code red for humanity" by the United Nations' (UN) Secretary-General (Alvarez, 2021; Secretary General, 2021). The UN's Intergovernmental Panel on Climate Change (IPCC) recently analyzed 14,000 scientific publications and cited irrefutable evidence that people are causing climate change. These changes will have a dramatic impact on human and natural ecosystems (United Nations, 2021).

In order to effectively support student learning and be able to implement sustainable practices, sustainability educators need to educate themselves regarding the issues affecting campus culture. For this to be possible, staff and faculty can draw upon case studies and research-based best practices to effectively negotiate their roles as professionals, educators, and advocates. College students report that dealing with climate change and other social challenges can negatively affect their mental health (Hiser & Lynch, 2021). How does this affect the abilities of students to impact change and influence the trajectory of higher education sustainability initiatives?

The authors discuss a variety of recent conflicts between staff, faculty, students, and higher education institutions that were complicated by personal activism. Examples include initiatives related to environmental and social governance, divestment, policy and hiring decisions, and strategic planning. This chapter analyzes recent high profile cases, like the tenure decisions between Nikole Hannah-Jones and the University of North Carolina, as well as differences over pedagogical practices between Cornel West and Harvard University. Amongst other personal activism cases, making the national news is that of the Supreme Court backing payments to N.C.A.A. student-athletes of color who sought equity and recognition.

These conflicts have been well documented and discussed among faculty and student affairs staff alike. They may contribute to the wavering confidence of higher education professionals who choose to support the political journeys of students or disclose their own personal ideologies on controversial topics. A lack of professional training or a fear of institutional

backlash for expressing personal beliefs can compromise the effectiveness of educators when they are teaching and advising students who participate in curricular and co-curricular political activities.

This chapter concludes with a toolkit, resources, and recommendations for further study. The authors highlight relevant professional organizations, training topics, mitigation responses, and tips for collaborating with campus and student organizations. These resources can help higher education professionals to build rapport and trust with their students while remaining protected from negative professional consequences. This chapter is designed to equip higher education professionals with the skills and resources needed to overcome potential barriers while supporting politically active students and supporting the implementation of higher education sustainability initiatives.

2 Trends in Student Activism and Institutional Sustainability Strategies

Seventy-five percent of students consider prospective colleges' environmental commitments to be a factor when selecting their majors and colleges of choice (Princeton Review, 2021), and a 2018 report from students and staff in the United Kingdom showed that 93% of respondents felt that sustainability was an important component of university education (Sustainability in Education, 2019). Student participation in sustainability activities has increased in recent years. This involvement intersects with students' emotional responses to sustainability issues (Devereaux, 2013). Recent research completed by the University of Hawaii (UH) System's Office of Sustainability focused on how UH students feel about climate change issues. Researchers found that the most common feeling among surveyed students was fear (selected by 37% of respondents), followed by hope (28%), anger (16%), sadness (15%), and shame (4.5%) (Hiser & Lynch, 2021).

Contemporary approaches to student activism can be analyzed within the context of the civic engagement, political interests, and social and emotional well-being of learners. Activism is defined as "engaging in direct, vigorous action to support or oppose one side of a controversial issue" (Allen, 2017). College student sustainability activism may focus on environmental and social governance (ESG); divestment; social justice and equity; service learning; and many other topics. While participating in

activism, the experiences of participants often connect with free speech, expression, politics, and conflicting views. Approaches to activism may also be impacted by factors such as social media, a plethora of information, and the interaction of users with online platforms. These interactions may vary as a result of factors such as age, ethnicity, race, and political affiliation (Auxier, 2020).

Students undergo personal and social development throughout their college experience (Tenant & Pogson, 2002). The involvement of learners in intentionally designed curricular and co-curricular sustainability activities can contribute to these growth processes. Students' evolving stages of development affect their interactions with other individuals, institutions, and authority and impact their level of cognitive complexity when analyzing systemic sustainability issues. Each of these factors requires effective strategies for advising and teaching college students who participate in activism. The wide range of sustainability topics provides a variety of opportunities for transformative learning through partnerships at the university, community, regional, national, and global level (United Nations, 2021).

Sustainability activism has been impacted by rapidly evolving social movements and COVID-19, but the topic is not new to higher education institutions. In recent years, a variety of sustainability-related policies and practices have fostered deeper student engagement in higher education. For example, the Association for the Advancement of Sustainability in Higher Education (AASHE) provides guidance, resources, and assessment tools for higher education institutions around the world through the comprehensive Sustainability Tracking and Rating System (STARS). STARS is described as "a transparent, self-reporting framework for colleges and universities to measure their sustainability performance" (AASHE, 2021). By participating in STARS, universities report on institutional changes within the categories of curriculum; engagement; operations; planning and administration; and innovation and leadership.

STARS campus engagement reporting allows universities to highlight peer-to-peer education activities found across the university governance structure. Many student activism initiatives take place within these learning activities. These programs may be led by students and supported by staff, or they may be managed by staff with participation by students. Examples of campus sustainability activism include, but are not limited to, student organizations and clubs, student government, organized protests, residence life activities, service-learning programs, student employment,

class group projects with a service component, and activism that is not affiliated with any specific campus organizations. Activism may also involve community members who have roles other than those of university-affiliated individuals.

Staff, faculty, and students who are involved in sustainability engagement programs may be unclear about their roles, the relative level of authority, goals, strategies, and relationships to the university administration. Balancing ambiguous identities with personal values on environmental justice topics can be a challenging task for professionals who feel the need to remain neutral even in the face of controversy. Later in the chapter, the authors provide clarity for those seeking to protect their livelihoods and professional careers while also advocating for their students and causes that are important to them. When considering the competencies of leaders within any role (student, faculty, staff, or community member), it is important to recognize that sustainability and environmental justice are multifaceted topics that provide a variety of ways to demonstrate commitment. Since sustainability competencies are founded upon systems thinking, anticipatory, cultural, normative, strategic, interpersonal, and integrated problem-solving competencies, it is helpful when a leader of sustainability activists understands how these knowledge bases work together (UNESCO, 2017; Wiek et al., 2011). Each competency is a "functionally linked complex of knowledge, skills, and attitudes that enable successful task performance and problem solving with respect to real-world sustainability problems, challenges, and opportunities" (p. 204). Indeed, the sustainability competencies that support student success are often the same skills most needed by faculty and staff who teach and advise those students. 3. The Role of Faculty and Staff Advisors

By understanding the ways in which students develop throughout college, faculty and staff can effectively lead sustainability activists by using a variety of approaches. The understanding of student development can be valuable when advising a group as diverse as students who are passionate about sustainability. In some situations, teaching someone about sustainable mindsets is not as impactful as being able to demonstrate how the passions and interests of students are connected to sustainability. For example, members of a student food pantry organization may reflect on how local food insecurity is inextricably connected to city planning, food deserts, equitable housing, and other topics. Moreover, articulating to students how environmental consciousness can improve and enhance their lives can foster motivation for students to actively engage in sustainability

activism. Subsequent to sharing a series of case study examples of student activism, this chapter presents a toolkit of tangible strategies that can be used to support student activists' development of core sustainability competencies and leadership skills.

In order to be effective, sustainability educators need to be informed about the issues affecting campus culture. Staff and faculty can draw upon cases and research-based best practices to sharpen the sometimes-blurry lines between their roles as professionals, educators, and advocates. A variety of conflicts between staff, faculty, students, and higher education institutions have been complicated by acts of personal activism. Lack of professional training or fear of backlash can compromise educators' effectiveness when they are teaching and advising students.

Understanding the motivations of student activists can be a crucial component of the work of educators. When seeking to understand the reasons behind student activism, educators can learn more about them—their stressors, their passions, and their desired impact on the world. With this knowledge comes a deeper capacity to relate to students and provide more opportunities to develop rapport. This understanding also allows educators to more effectively support their students' learning journey.

3 Examples of Divestment Activism

While some student activists may seek symbolic victories that do not result in tangible institutional changes, many students often seek to create specific changes to university policies and practices. One important example is the worldwide push from students demanding that their universities divest from fossil fuels. Recent institutional divestment trends provide valuable insights about how student activism intersects with politics, free speech, and university administration. According to a study completed by the National Association of College and University Business Officers (NACUBO), 19% of institutions include Environmental, Social, and Corporate Governance (ESG) in their investment decisions. The list of universities who have made divestment commitments continues to grow each year. According to Georges Dyer, Executive Director of the Intentional Endowments Network, divestment will continue to gain traction, even at institutions with a historical dependence on fossil fuels (Whitford, 2021).

The journey of each higher education institution to decide whether they will divest has been unique. The Global Fossil Fuel Divestment

Commitments Database reports that 1500 institutions are divesting with an approximate value of $39.88 trillion (2021). With the largest university endowment in the United States, Harvard University began their divestment process in September 2021, after years of advocacy that included the student-led Fossil Fuel Divest Harvard (FFDH) initiative. At times, FFDH had been at odds with the administration and had even initiated a lawsuit in the Massachusetts Appeals Court (which was eventually rejected). The lawsuit claimed that the Harvard Corporation violated the requirements of non-profit institutions by making investments that ignored social responsibility (Jaschik, 2016). During a 2019 football game between Harvard and Yale, student protestors from FFDH and Fossil Free Yale ran onto the field with signs and banners. Activists demanded that the two universities divest from their current financial holdings that were supporting the fossil fuel industry. One of the organizing groups stated that the two universities had "no right to profit off the destruction of the planet and land" (Burke, 2019). Their protest also included a call to cancel investments that generate profit from Puerto Rican debt. Fans joined the protestors on the field, and dozens of Yale and Harvard students were cited for disorderly conduct (Gringlas, 2019).

In another example of divestment-related student activism, the student-led Divest Portland State campaign at Portland State University (PSU) shifted political goals over multiple years as student leadership changed. The group was originally focused specifically on divesting the university endowment fund from fossil fuels and was led by a group of students affiliated with a student engagement program. The initiative later became embroiled in controversy after the Student Senate passed a resolution to divest from companies working with the Israeli military. The resolution made strong political claims about the conflict between Israel and Palestine. PSU's President authored a statement calling the resolution "divisive and ill-informed," and a variety of news outlets covered the story (JTA, 2016).

Protests that call for university divestment from fossil fuels represent a continuation of activism dating from as far back as the 1980s. One of the biggest differences between then and now, however, is that contemporary protests have proven to be very effective, resulting in public statements by many universities to begin the long process of fossil fuel divestment (Melia, 2020; Treisman, 2021). The impacts of these divestments are often difficult to measure, due to the complex nature of financial investment funds; however, the movement itself serves to both weaken the value of financial holdings in fossil fuels and to strengthen the negative social perception of

those institutions who remain invested. Divestment can also catalyze a strong social call for investment in a cleaner economy that prioritizes renewable energy and, at the same time, presents long-term strategic advantages for universities (Richardson, 2016).

Divestment-related protests have occurred at universities across the nation, as students recognize that their collective voices can begin to influence emerging policies surrounding carbon emissions and fossil fuel utilization (Melia, 2020). How do these and other current trends in higher education influence the structure and function of sustainability engagement programs? The experiences, perspectives, and development of students both impact and are impacted by involvement in activism in college life. By understanding student experience across the educational spectrum, higher education professionals are better equipped to support student learning, growth, and their development as effective sustainability leaders.

The recommendations that follow are designed to equip higher education professionals with the skills and resources needed to overcome barriers, while supporting politically active students and the strategic implementation of higher education sustainability initiatives. The authors have provided a toolkit containing resources, recommendations, and lessons for engaging with protests and sustainability initiatives. Sustainability activism will inevitably intersect with other campus activism. By connecting with and supporting student activism, professionals in higher education have the opportunity to strengthen relationships with students and more deeply embed sustainability within the fabric and culture of their institutions.

4 Toolkit for Faculty and Staff Who Advise Sustainability Activists

For as long as there have been students at universities, there have been student movements. Campus life is where many activists first find their voices and develop leadership skills. Campuses have a responsibility to support students in their developmental processes throughout their educational journey. This toolkit offers a list of resources, recommendations for engagement, and lessons that universities can consider when teaching and advising sustainability activists.

Develop Professional Competencies

Faculty and staff can begin their work to more effectively engage student sustainability activists by reviewing and practicing professional competencies. NASPA provides a robust set of competencies that can be utilized by student affairs practitioners as well as educators from other university departments. The Student Affairs Administrators in Higher Education (NASPA) lists the following sets of competencies: values; personal and ethical foundations; law, policy, and governance; social justice and inclusion; leadership; and advising, among others. Each area includes descriptions of foundational, intermediate, and advanced competencies so that educators can reflect on their own growth (Cole, 2021). In tandem with the recommendations below, these competencies may be most helpful to university professionals as they consider their roles and boundaries while teaching and advising student sustainability activists.

As sustainability engagement occurs across all departments and academic disciplines, educators should consider relevant professional competencies in their own educational focus area. Sustainability engagement can occur across all departments and academic disciplines. An understanding of developments in one's own functional area, as well as current trends in sustainability activism, can provide context for engaging with students and colleagues.

Question to process:

1. Does your campus and profession have established professional competencies?
2. What are your professional strengths, and what skills would support your effectiveness while working with sustainability activism?
3. What trainings and resources are available for you to improve these skills?

Create a Plan for Responding Efficiently and Quickly if Activism Escalates

It is no surprise that universities can be slow to respond to time-sensitive situations, as many layers of leadership need to approve the final response to actions of activists. When a crisis occurs, it is vital that the university responds with accurate information and policies that have been researched

and vetted. A delayed, disorganized, or hasty response can quickly become a communication and image issue for the university. Campus leadership should develop a communication playbook for responding to crises in a timely manner. The response playbook should have drafted communication, talking points, and an action plan based on the most impactful situations that have occurred in the past five years as a guide to future crises. By creating a communication playbook, universities will be better prepared to respond quickly and more efficiently. Each campus should define an appropriate response timeline with a statement and action plan, which should include next steps.

Questions to process:

1. How quickly did your campus respond after the most recent public demonstration? Was the response effective? Could the response be improved for similar future situations?
2. Does your campus have a communication playbook?
   (a) If not, what core issues should this playbook address? Who needs to be involved in creating this playbook? Which administrators would need to approve the playbook before implementation?

Train Faculty and Staff to Effectively Engage with Activism

Freedom of expression is a right that is only restricted by time, place, and manner for all students. College campuses should support and encourage activism, protests, and acts of free speech. Luke Martell, professor of political sociology at the University of Sussex, says that student protests should be encouraged and that "how management responds to it is about the sort of university you have in the first place" (Shaw, 2018).

Decisions made by some campuses to limit student activism have created backlash. In 2019, Brandeis University in Massachusetts changed their policy on student demonstrations to require that student activists seek approval from the university before holding protests. Activists criticized the new policy for "restricting freedom of speech and making peaceful demonstration more difficult" (Daily Orange, 2020). The administration was perceived to be suppressing protests, and the administration was perceived to be suppressing protests.

Activism is always changing and evolving, from street protests to online engagement. Staff should be given opportunities to participate in ongoing

professional training and education about best practices, historical events, and campus case studies that relate to campus activism (Staff et al., 2020; Schussman & Soule, 2005; Padilla, 2013; Ellsworth & Burns, 1970; Cho, 2020; Carlton, 2020). Consider inviting an expert guest speaker, hosting a staff and faculty training, or creating a website about topics such as free speech; time, place, and manner; and relevant campus activism topics. Lay the groundwork for the group by sharing policies and laws so that participants have the foundational knowledge necessary to understand which policies are non-negotiable. Provide opportunities for participants to discuss case studies and how they might best respond in specific situations. Individual and group reflection allows staff and faculty to work through "what if" scenarios together and share their experiences and expertise. Student affairs units often have experience working with student activists. They may already offer relevant training on free speech, university policies, and student development. Partnerships with student affairs can also create a networked approach to addressing student concerns and minimizing escalation of conflicts (Spalding & Wise, 2016).

If faculty and staff are planning to meet to speak about controversial issues, ensure that facts, and not commentary, are the driving force. Original fact reporting can be a foundation for dialogue on a controversial topic. Vetted resources can be used to uncover the truth and allow others to decide what it means and how it should be applied. According to the North American Association for Environmental Education (NAAEE), one of the professional responsibilities of environmental educators is to emphasize education rather than advocacy (2019). John Hug recommends that educators focus on providing "value free" space for dialogue, debate, and education rather than taking specific positions in the context of their educator role. He sees the role of the environmental educator as a "developer of skills and an information analyst who prepares the people (from any segment of the population) who will participate in environmental decision-making" (Hug, 2010, p. 24).

While an educator may not be able to march or protest alongside students given their assigned role, a primary responsibility of higher education professionals is to ensure the safety of their students. Actions to support students may include: coaching students about how to stay safe during active protests, providing water to protestors, educating students about the laws and approved spaces for free speech, and liaising with law enforcement to ensure that acts of activism do not yield legal ramifications that can jeopardize the blossoming careers of students, faculty, and staff.

Statements can also be taken out of context by media outlets and on social media, which may carry a significant risk for both students and educators. It is common practice for higher education administrators to include a statement in their biographies or profiles that reads something such as "These opinions are my own and not necessarily the stance of 'x' institution." This clarification does not remove the author from all responsibility, but it does create a level of separation by suggesting that statements are made as a private citizen rather than as a representative of the institution.

Questions to process:

1. Which faculty or staff on campus can speak formally or informally about controversial issues?
2. What training and expertise can you draw from your professional life in order to better understand your role as an educator of sustainability activists?
3. What free speech policies does your campus already have to support and respond to protests and activism?
4. Does your campus have a time, place, and manner clause?

Create an Inclusive Environment

Faculty and staff are the backbone of any college campus; as such, they have a responsibility to set the tone for campus culture. To fully understand this environment, faculty and staff must examine campus culture from the perspective of all stakeholders (faculty, staff, undergraduate, graduate, professional, alumni, and community). Though stakeholder views, goals, and strategies will not always align, understanding these different positions will help faculty and staff to create a more inclusive and informed institution. NASPA's Policy and Practice Series document recommends that "student affairs professionals better understand safe and brave spaces and challenges these individuals and their campuses to prioritize the use of these spaces to ensure educational access and success for the entire campus community" (Ali, 2017).

Educators should provide a variety of ways for students to access and meaningfully participate in university decision-making and governance. It is important to design fair, transparent, and accessible candidate selection processes when choosing students for leadership positions, so that each

individual understands how to participate and has equal opportunity. Educators can also select student leaders from diverse backgrounds, interests, and approaches to serve as role models to the student body.

Questions to process:

1. How is your campus cultivating an inclusive environment?
2. How do staff, faculty, and administration provide safe and brave spaces to challenge students?

5 Creating Transformative Development and Sustainability Leadership Opportunities for Diverse Learners

Sustainability educators can draw upon a wide range of resources to provide recommendations, best practices, and standards for programs and activities. Students are able to learn and practice sustainability and leadership, build teams and coalitions, navigate the university system, develop a nuanced understanding of strategies and changes that will lead to a sustainable world, and to reflect on their experiences.

Educators can review and implement sustainability program standards developed by the Council for the Advancement of Standards in Higher Education (CAS), the NASPA Sustainability Knowledge Community, and the Association for the Advancement of Sustainability in Higher Education (AASHE). The CAS Standards provide a comprehensive set of guidelines for sustainability programs that include mission and goals; program design; student learning, development, and success; learning outcomes and assessment; access, equity, diversity, and inclusion; leadership management, and supervision; human resources; collaboration and communication; ethics, law, and policy; financial resources; and technology (CAS, 2019).

Educators should also educate themselves about core student development theories and the ways in which this process will impact the way students approach activism during their college experience (Astin et al., 2011; Chickering, 1993; Keeling, 2006; Tenant & Pogson, 2002). With this context, educators can use sustainability-focused pedagogical practices to design curricular and co-curricular learning experiences (Burns et al., 2019; Filho, 2002) and learning outcomes that support sustainability competencies (Archambault et al., 2016; Wiek et al., 2011). Student

leadership and development theories offer students opportunities to identify and grow as leaders while participating in activism with their peers (Komives et al., 2011).

Question to process:

1. What opportunities does your campus offer around transformative development and sustainability leadership? 2. What opportunities can be created to better serve students' development and interests?

Create Mutually Beneficial Relationships

Rather than responding only after situations escalate, faculty and staff can proactively focus on building strong, mutually beneficial relationships with campus and community stakeholders year-round. By developing trust and communication, faculty and staff will find support and allies when campus politics become difficult. They may also be better able to provide resources and support for students. As a result, everyone can ask for help when needed, get and give support, be honest, have difficult conversations, provide insight, be vulnerable, and communicate openly. It is important for faculty and staff to build learning communities with and among students, campus leadership, and alumni, as well as internal and external organizations. Alignment with local and global stakeholders help educators learn from other initiatives' successes and challenges (AASHE, 2021; UNESCO, 2014). Attending higher education sustainability conferences inspires students and staff to connect with other initiatives and peer programs.

Building relationships depends on strong communication; two-way dialogue is vital between campus leadership and campus stakeholders, especially in the midst of controversy. The Association of American Colleges & Universities underlines the importance of sharing official statements from senior campus leaders and engaging students, faculty, and staff proactively in discussions about free speech:

> Tensions often run high when campus free speech controversies emerge. Productive conversations about free speech and inclusion among students, faculty, and staff before a controversy occurs can position a campus to navigate such situations, especially if the stakeholders are able to come to a consensus around the institution's values and related policies. Free speech, academic freedom, and inclusion are at the core of the modern university's

> mission. Students, faculty, and staff deserve ready access to their institution's positions regarding these values and the policies that bring these values to life. (Free Speech on Campus: How Universities Can Communicate Our Policies, 2021)

It is also important for the student body to hear faculty and staff praise their activism even as they are supported in building their strategic thinking and cognitive development. Students need to know that they are permitted to assemble peacefully and make their voices heard. The Harvard Graduate School of Education states that "helping students develop their analytical skills, rather than simply their ability to memorize facts and processes, is a tricky project—something that separates an exemplary teacher from a good one. Among the avenues for encouraging those deeper-thinking tools: positive, public reinforcement of the strong thinking you hear and observe in your classroom" (Usable Knowledge, 2017).

Questions to process:

1. How can your campus improve relationships with stakeholders?
2. Which sustainability-related community organizations could connect with your campus?

Strategically Align with Campus Safety and Police

In 2020, "defund the police" became a slogan on many US college campuses after increased media attention highlighted multiple murders of people of color by police. Tensions began to rise on campuses across the nation, often with calls to remove police presence altogether. It is beyond the scope of this article to debate the pros and cons of police presence on college campuses. In relation to student sustainability activism, the authors do recommend that universities create strategies and plans to work with police around demonstrations and protests. The university should have a clear understanding of the respective roles and responsibilities of both their campus safety office as well as local police. Campus safety staff may or may not be sworn officers. Their designation will impact how they interact with and are perceived by students.

As well, faculty and staff should be aware of how social factors impact student experiences at college. Data has shown that students of color are negatively impacted by campus police relative to white students. According

to the ACLU, "if historical trends in the data hold true, law enforcement in schools will continue to disproportionately target students of color, students with disabilities, and students of color with disabilities" (*ACLU News & Commentary*, Resendes, 2020). One example comes directly from Northwestern University. According to the Washington Post, "Northwestern University faculty members in the Department of African American Studies noted that Black students are only 6 percent of the student body but Black people accounted for up to 40 percent of officer-initiated police stops on campus" (Cole, 2021). The perceptions of student activists regarding police may affect the way they interact with school administration and the strategies they utilize to accomplish their goals. Senior leadership must have a plan with defined roles and responsibilities for police at campus protests. Campuses across the country must learn from the many lessons learned by past police responses.

Questions to process:

1. Does your campus have a plan for how campus safety and municipal police will respond during a protest or escalation of conflict?
2. Do municipal police need to be called when protests occur on campus? In which situations? If not, who is responsible for deciding the appropriate university response if escalation occurs?

6 Conclusion

Improving the sustainability of college campuses is a complex process. Environmental justice, divestment, sustainable policies, practices, and strategies are becoming increasingly important to students. Institutions would be wise to maintain a public and proactive organizational approach that reflects higher education and professional values. Faculty and staff play an important role in coaching students to move the needle on social, economic, and environmental change in society, and students have greater power for social change on their campuses than they may realize. It is imperative that students are able to call on their leadership to invest in the health of our planet now and for the sake of future generations. Sustainability leaders can make an impact by embodying qualities of tact, diplomacy, passion, critical thought, and persuasion. Current sustainability activism topics, from fossil fuels to fair trade, present challenging issues that demonstrate levels of commitment on the part of educational

institutions to create comprehensive environmental justice. Remaining neutral in the face of social injustice allows oppressive systems to endure. Educators must find ways to safely express their opinions and support the causes about which they are passionate. The comprehensive toolkits presented in the chapter are offered as a way for educators to better understand how they can safely and authentically support sustainability activists while maintaining their professional roles.

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Future Managers' Perspective on Attaining the Sustainable Development Goals and Sustainability in India

Durdana Ovais, Richi Simon, and Shumayela Hasan

1 Introduction

Though sustainability research has made substantial progress in many areas of global development policy and practice (Oktay & Hoskara, 2007), such as eco-friendly or green buildings (Figueroa et al., 2010/2016), planning and administration (Rahman et al., 2020), and efforts integrate environmental, social, and economic sciences (Spandau et al., 2012), further steps toward interdisciplinarity are needed as different disciplines can provide different perspectives and strategies in the areas of sustainability ethics and sustainability research (Becker, 2012).

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The term 'sustainability' is largely associated with sustainable development and sustainability science. Sustainability means to create and maintain the conditions under which humans and nature can exist in productive harmony to support present and future generations. Further, Camarinha-Matos et al. (2010) discuss the spheres of sustainability and argue that there are three pillars of sustainable development—social, economic, and environmental.

Of all the complex problems that sustainability science and sustainability-related research tackle, the main challenge lies in integrating knowledge and methods from varied disciplines, which requires both a stakeholder-oriented approach and methodological innovation (Schoolman et al., 2012). The need to consider the three main pillars of sustainability calls for both a more holistic perspective of the problems and a tighter collaboration among a wide range of stakeholders (Camarinha-Matos et al., 2010). Further, the most pressing problems that sustainability science needs to solve should be defined by society, not by scientists; thus, involving stakeholders in the process is both a prerequisite for success as well as a key challenge (Jäger, 2009). The issues researched and presented by the scientist and the academic still lack the voice of the grassroot-level stakeholders. It should also be noted that sustainability is a value-loaded and socially charged discourse and the experiences of natural scientists lack self-reflectiveness as they understand the issues of sustainability only from the natural science perspective and not from the social perspective, that is, their operational definition of sustainability largely varies from that of the social scientists (Lele & Norgaard, 1996). It is essential to transform sustainability science into a transdisciplinary enterprise to generate positive social and environmental change globally, for which renewed communication strategies, research, and public policies for research and its grants, fund allocation, and so on are needed. Further, a need to engage society and to creatively employ all sources of knowledge is a must (Shrivastava et al., 2020).

Education serves the purpose of creating responsible citizens and encourages social welfare and national development (Chandra et al., 1996). Further, youth are seen as the force to bring change. Sustainability research should aim for a transformational and solution-driven research agenda (Miller et al., 2014). Despite the increasing number of professionals involved in sustainability, there is still a need for more trained specialists in higher education institutions in order to properly advance this research field. Another issue is the absence of proper collaboration, networking,

and coordination between different educational institutions (Jäger, 2009). A great acceleration is generated and sustained by powerful economic mechanisms such as globalization, marketization, and financialization, which are based on the mainstream model of doing business and promoting economic growth (Boda & Zsolnai, 2016). The global economy and the five earth systems—geosphere, biosphere, cryosphere, hydrosphere, and atmosphere—are on a collision course that will ultimately have dire consequences for humans and the biosphere (Shrivastava et al., 2020).

Sustainability research in the developing world is lagging behind the scholarship of more developed countries, creating knowledge gaps that need to be addressed (Mukhopadhyay et al., 2014). This is largely because even policy-level interventions are not researched at a level that identify need and consequence. While analyzing green growth policies, one is likely to ignore the way they can give advantage to domestic firms and industries. These policies have heterogeneous effects on economies in the Global South. The way the firms and industries react to green growth policies will further decide the outcomes of these policies, whether they will result in scaling up the economies of developing countries while maintaining a transition to low-carbon trajectories or not. However, most research studies are based on BRICS (Brazil, Russia, India, China, and South Africa) and MINT (Mexico, Indonesia, Nigeria, and Turkey) economies, whereby it is seen that they have successfully deployed green growth policies. An example is China's effective usage of electric vehicles, becoming the lead market in electric vehicles. The problem, however, lies in the dearth of research on green growth in developing countries, which limits the overall understanding of the effect of green growth policies in Global South (Herman, 2021). Sady et al. (2019) and Puig et al. (2019) establish that universities play a key role in meeting the challenges of sustainability through education. As per the 2017–2018 All India Survey of Higher Education Data (AISHE), India's higher education system is considered the third largest in the world with about 36.6 million students enrolled in postsecondary educational institutions (Ministry of Human Resource Development, Government of India, 2018). Despite being such a large sector, conversations about the integration of the SDGs in the operations of Higher Education Institutes (HEIs) are still few and far between. The National Associations of Higher Education have not seriously taken up the matter of sustainability and have hardly done any detailing with the role of educational institutions in sustainable development. The Federation of Indian Chambers of Commerce and Industry's (FICCI)

Higher Education Committee has been bringing private institutions together for the past two decades. Yet, it has not stressed to its members the importance of advancing the SDGs in HEIs. Also, NITI Aayog—the apex public policy think tank of the Government of India in its national approach to achieving the SDGs in India—makes no mention of HEIs, not even of their likely contributions to the attainment of the Sustainable Development Goals, such as education and awareness building. The 2022 Times Higher Education (THE) ranking report on universities and SDGs shows that only a handful of Indian universities are working in this direction; this list does not include any elite public institutions like Indian Institutes of Technology (IITs) and Indian Institutes of Management (IIMs), nor are these even mentioned in the report (Bothwell, 2018). The report suggests that Indian policymakers should think about innovative ways that HEIs can support the achievement of the SDGs (Bothwell, 2018).

2 The Study

Sustainable development is a collective responsibility. The indifferent and casual attitude of India toward attaining the SDGs and the lack of accountability of stakeholders, especially within the educational institutions, inspired our research. In this chapter, we explore the role of educational institutions in inspiring and affecting the perspectives of future managers, that is, the current management students who will be engaged in administrative roles in the future. It is clear that youth are the future of the nation. The study is undertaken to understand how emerging concepts like corporate greening, green HRM, green marketing, and green entrepreneurship will take shape in India in the future.

Applying the conceptual framework of Theory U, the quantitative cross-section exploratory research study is undertaken using a self-designed scale. Multistage sampling was used to select 536 management students using convenience sampling. At level 2, we employed purposive sampling to reach a sub-set of 310 management respondents who had prior knowledge of the SDGs. Smart PLS SEM 3.3.3 was used to apply regression analysis and Structural Equation Modeling. Our original hypothesis was that one's understanding of a subject and the importance they attach to that understanding has an impact on one's lifestyle. However, in the context of SDGs, our results show that although an understanding of the SDGs influences individual conceptualization of how SDGs are to be attained, our sample shows that this understanding is not significantly associated with lifestyle.

Our data also indicates that the importance one attaches to the SDGs does not influence one's lifestyle choices. Our research offers crucial insight into the psychology of youth and future business managers. It also indicates that we are still at the sensing stage of Theory U. Our findings are significant in the light of a much-needed behavioral nudge required to achieve the SDGs at both the societal and national levels, which will require individual initiatives. Further, the study indicates that a sync is needed between researchers, government, scientific communities, agencies working for sustainable development, and society at large.

3 Literature Review

Lifestyle and Perceptions of the Sustainable Development Goals

According to Jensen (2007), lifestyle can be defined at many different levels—some define it as the way of living (Pulkkinen & Kokko, 2000), whereas others define it in terms of health-related factors (Bolt, 2002), while others define it as what one consumes (Poster, 2004). There are four levels at which lifestyle can be discussed—the global level, the structural/national level, the positional/sub-cultural level, and the individual level. Though we define them separately, these levels are all intertwined. Lifestyle depends on cultural qualities and has a time orientation, that is to say, lifestyle is a dynamic construct that varies with culture and time. It is defined by means of actions, communications, and beliefs (Fern, 2001). Mahatma Gandhi stated that individuals should "be the change you wish to see in the world" (*Mahatma Gandhi Quotes*, n.d.). Following this ideology, change is not limited to some of the big corporations, such as LG, Samsung India, Tata Consultancy Services, Oil and Natural Gas Company, ITC limited, and so on (Choudhary, 2017). Deloitte's 2017 report acknowledges that businesses (particularly the big corporations in India) can work toward achieving the SDGs in ways that benefit both the business and humanity. Still, there are very few corporations and businesses that have moved from a profit-making agenda toward the achievement of the SDGs. Concepts like 'creating shared value', that is, creating something that is held as significant by every stakeholder, as proposed by Porter and Kramer (2011), must be widely accepted by governments, corporations, and civil society to have a positive impact on change (Harvard Business Review, 2019). Torneire (2020) and Elder and King (2018)

further elaborate upon certain lifestyle practices that the government can promote, such as integrating the SDGs into national planning and creating implementation strategies to positively impact the fulfillment of the SDGs. Mantay (2019) denies the popular belief that the majority of inactive citizens, those who are least bothered of SDG attainment, are either not interested in the workings of society or believe that they, as individuals, are powerless to bring about change. Mantay (2019) suggests that placing partnership over competitiveness yields better results. So, if each stakeholder responsibly caters to their role in meeting the SDGs, attaining the SDGs by 2030 is certainly achievable.

Education, Understanding, and Perceptions of the Sustainable Development Goals

The SDGs encompass an extensive range of multifarious social, economic, and environmental challenges. The need to meet these goals and to ensure meaningful transformations prompts all sectors to operate in more collaborative, networked, universal, and responsible ways (Sachs et al., 2019). Though there are many stakeholders that can play a vital role in achieving the SDGs, the Sustainable Development Solutions Network (SDSN) (2020) identifies universities as a unit that can be instrumental in the implementation of every SDG through teaching and learning, research, organizational governance, culture, operations, and external leadership; as such, universities are a critical partner for the realization of the SDGs (Kestin et al., 2017). The role of universities in education, research, and innovation, as well as their contribution to civic, societal, and community-level leadership, suggests that they should be held accountable in helping society to be educated, sensitized, and responsive toward the attainment of the SDGs. Education should aim to provide individuals, communities, and HEIs themselves with the ability to comprehend, adapt, and respond to the challenges of sustainable development (UNESCO, 2015). Further, Zhou et al. (2020) find that students' satisfaction with curricula increases with the introduction of sustainability-related content, which in turn educates them about socioeconomic and environmental sustainability issues at the global level. Universities can certainly play a role in educating stakeholders, but still a problem persists, which can be explained using the GI Joe fallacy. The GI Joe fallacy was introduced by Laurie Santos and Tamar Gendler and is inspired by the TV cartoon G. I. Joe, known for the famous epithet "Now you know. And knowing is half the battle" (YouTube [Tanix

Kington], 2009). Though this suggests that knowing something helps win the battle, in reality, knowledge, unless put to action, changes nothing. Also, this idea of knowledge as victory is not based on how one's mind works because the thought process is generally affected by implicit biases, which at times stops one from taking action. Thus, according to the GI Joe Fallacy, there lies a serious disconnect between knowing and doing (Santos & Gendler, 2014). The problem lies in "the disconnect," that is, the knowing–doing gap, the disconnect that lies between our collective consciousness and collective actions.

Actions Related to and Perceptions of the Sustainable Development Goals

Scharmer (2017) describes that in most societal systems, we collectively create results that are undesirable as depicted in Table 1.

These disconnects create results that are generally unwanted. To work on these disconnects, universities and schools can play a vital role, but the absence of vertical literacy about sustainability and sustainable development primarily limits the functioning of educational institutions in contributing toward attainment of the SDGs. Our learners and our societal

Table 1 Three divides between action and perception regarding the Sustainable Development Goals

Sr. no.	*Undesirable result*	*Description*
1	Ecological divide	The self–Nature disconnect. The ecological divide makes oneself feel separated from Nature. Human activities have resulted in environmental problems like pollution, global warming, natural disasters, hole in the ozone layer, climate change, etc. In order to overcome these problems, individuals must feel connected to Nature.
2	Social divide	The self–other disconnect. The social allows oneself to relate to some while distinguish one from others. It is an us vs. them scenario which results in cynicism and intolerance. In order to work on global issues such as sustainable development, this must be addressed.
3	Self–self-disconnect	The disconnection between one's current and emerging future self. The present, unless it is connected to the emerging future, will pose serious limitation in attainment of the SDGs by 2030. This disconnect will seriously jeopardize the very essence of sustainability itself.

systems are largely missing from conversations about making systems more responsive to environmental needs, particularly in terms of upgrading the operations of the educational system with respect to the student community (Scharmer, 2019). "What's In It For Me (WIIFM)?" becomes the question behind action for most people. Becoming aware of a concern is just the beginning; validating and supporting the journey becomes more important. Proper communication and honest dialogue will break silos and prepare people for the change (Tsaousides, 2020).

From the literature, it becomes clear that an individual's lifestyle is affected by one's own beliefs that emerge from the cultural framework in which one is born and raised. Lifestyle has a time and space orientation. Educational institutions can place value and importance on the SDGs, imbuing a sense of responsibility on its students that could contribute to significant lifestyle changes that would be impactful and incorporated in various business and corporate settings. Though there are multiple stakeholders, and some of them are taking steps toward the attainment of the SDGs, it is still a collective responsibility in which the educational institutions can play a significant role. However, it is not yet happening, and the accountability of educational institutions in the realm of environment sustainability is not being discussed broadly enough. The literature also suggests that introducing topics related to sustainability into educational curricula increases student satisfaction and thus, has the dual benefit of enriching their knowledge and keeping them satisfied. In turn, educating students on sustainability is also expected to equip them to face future environmental challenges. By strategizing the steps, one can ensure that each one gets the sense of WIIFM and cooperates in the direction of fulfilling the SDGs. This will help in bringing much needed behavioral changes and will serve a step toward pro-environmental behavior.

4 Conceptual Framework

Scharmer (2018) posits Theory U, which presents five processes that underpin change: co-initiating, co-sensing, presencing, co-creating, and co-evolving. Any change, whether it be in a tangible product or an intangible phenomena, has to undergo certain steps and cannot be institutionalized otherwise. Theory U suggests the development of change as follows: downloading from the past patterns, breaking them gradually, and then progressing toward embodying and performing. Theory U encourages one to step into the emerging future (see Fig. 1).

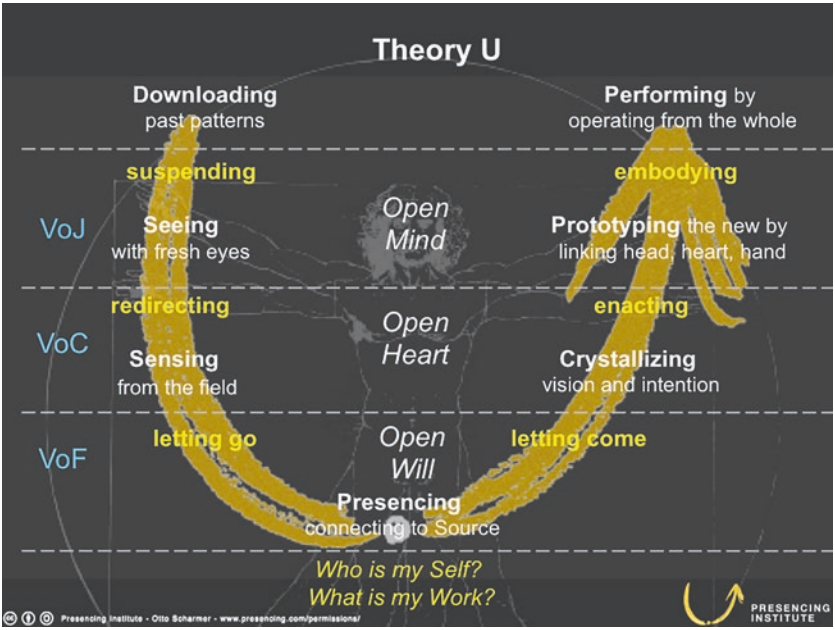

Fig. 1 Theory U

Shukla et al. (2019) suggest that perception shapes the cognitive processes that help humans interpret these life experiences from the given social environment and produce relevant response strategies. Perception has been defined as the process of receiving, selecting, organizing, interpreting, checking, and reacting to sensory stimuli or data (Pareek et al., 1981). Freeman et al. (2011) find a dynamic continuity between a person's perception and their actions. Thus, if action is to take place, perception needs to be studied. Forehand and Von Haller (1964) describe perception as the process of becoming aware of salient situations and adding meaningful associations to the sensations. Asch's experiments, performed in the 1950s on a group of participants to compare the length of the lines drawn on chart paper for the experiment, also suggest that people may willingly ignore reality and conform to the group. The experiments further imply that conformity increases with a rise in the number of people accepting a particular view, if the task is of a complex nature, and if it is in the presence of influential people (Asch, 1955). There have been many

Fig. 2 Conceptual framework of presencing

studies performed to test the correlation between perception, willingness, and behavior, the results of which show a strong relationship between these constructs (Caniato & Gasparella, 2019).

Based on Theory U, we propose the following conceptual framework. This research study undertakes three constructs: (1) Lifestyle impact on the SDGSs; (2) understanding of the SDGs; and (3) the impact of lifestyle on the SDGs. The variable of importance attached to SDGs is taken as a mediator. Presencing, which is a combination of sensing + presence, is the capacity to connect to the deepest source of one's self. It then allows the future to emerge from the whole self rather than from meager interest (Scharmer, 2018). It is only in the post-presencing stage, that is, after sensing and letting go of the current practices, that change can happen and be anticipated. In this chapter, we have used the construct of understanding to seeing and importance to sensing, which are essential to achieve presencing (see Fig. 2). Understanding and importance can create a lifestyle impact, which is essential to inspire oneself toward a Proactive Environment Behavior. This also ensures accountability toward the accomplishment of the SDGs.

5 Methodology

Our exploratory research design is based on a quantitative research approach commonly adopted in the social sciences (Sekaran et al., 2001). Adopting a cross-sectional research design (Kumar et al., 2013), we use data collected during the first two weeks of August 2021, compiled from a structured questionnaire (see Appendix). Three constructs are studied using the three-part framework of Theory U detailed above. Literature suggests that partnership over competitiveness results in better change prospects (Mantay, 2019). Further, as suggested by UNESCO (2015), universities are a key stakeholder in materializing SDGs, thus,

management students were selected for the survey. Further inspired from Scharmer's work, we use the construct of understanding as synonymous to seeing and importance as synonymous to sensing as depicted in Theory U, which are essential to achieve the presencing stage, that is, lifestyle impact, of Theory U (Scharmer, 2018).

The questionnaire consisted of four parts aimed specifically at exploring the levels of understanding and importance attached to the SDGs and the perceived impact of lifestyle on attainment of the SDGs (see Table 2).

The data was collected through Google forms and the survey targeted business management students. The sample initially included students who had both heard of the SDGs as well as those who had not. The analysis is based on the responses of students who were aware of the SDGs. Total of 310 valid samples were drawn from the youth of the Indian state of Madhya Pradesh and were analyzed; incomplete forms and those responses which indicated that they had never heard of the SDGs were

Table 2 Description of the tool used for exploring the level of understanding of and the importance attached to the SDGs and the perceived impact of lifestyle on the attainment of the SDGs

Parts	*Description*
Part A—Demographic details	This section consisted of questions related to age, gender, area of residence, and whether they had heard about the SDGs. The Google form then led the respondents to the next section if their response confirmed an awareness of the SDGs.
Part B—Understanding of the SDGs	The respondents were asked to what extent they understand the current situation of each goal. A five-point Likert scale was used with scale ranging from "Fully Understand" to "Not understand at all," where 5 was "Fully Understand" and 1 was "Not understand at all."
Part C—Impact of lifestyle on attainment of the SDGs	The perception of participants toward impact of lifestyle on the SDG attainment was studied. A five-point Likert scale was used with scale ranging from "Strongly Agree" to "Strongly Disagree," where 5 was "Strongly Agree" and 1 was "Strongly Disagree."
Part D—Importance	Participant's level of importance attached to the SDGs was studied. A five-point Likert scale was used with scale ranging from "Very Important" to "Not Important," where 5 was "Very Important" and 1 was "Not Important."
One open-ended question regarding how the respondents think HEIs can help in achieving the SDGs was included.	

removed. Out of a total of 536 respondents, 226 acknowledged being unaware of the SDGs; therefore, they were not directed to the next section of questions. Finally, we employ Smart PLS SEM (3.3.2) following the procedure set by Ringle et al. (2014).

6 Results

We measured the three reflective constructs for reliability and validity in the software, taking the set limits by earlier research studies into consideration (Fig. 3; Hair et al., 2017). The set criteria are elaborated below.

The results are given below.

Table 3 presents the reliability of the constructs. The first measure was Cronbach's Alpha. It is a commonly used method of analyzing reliability, which should be more than 0.7. Regarding reliability assessed through Cronbach's Alpha, a value of more than 0.7 is considered as reliable and all three of our constructs have a value of more than 0.7. All the constructs have a score of more than 0.9, meeting the set parameter. The approach of Dijkstra and Henseler's rho_A for assessing composite construct dependability was used, the values must be more than 0.6 (Dijkstra & Henseler, 2015; Schuberth et al., 2018). The results of Dijkstra and Henseler's rho_A analysis are also higher than 0.6 and are considered reliable (Schuberth et al., 2018). If Composite reliability and Average Variance

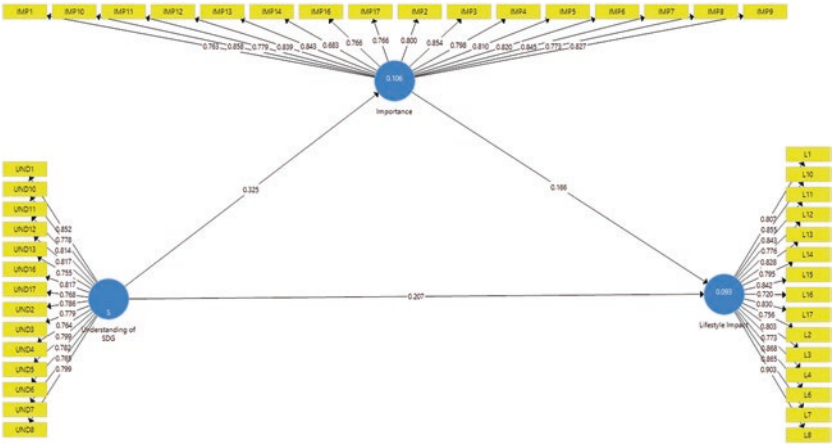

Fig. 3 Measurement model

Table 3 Reliability of the three constructs of the study

	Cronbach's Alpha	*rho_A*	*Composite reliability*	*Average variance extracted (AVE)*
Importance	0.963	0.970	0.967	0.644
Lifestyle	0.966	0.976	0.968	0.671
Understanding of SDG	0.954	0.965	0.959	0.626

Table 4 Validity of the three constructs of the study (Fornell–Larcker Criterion)

	Importance	*Lifestyle impact*	*Understanding of SDG*
Importance	0.803		
Lifestyle impact	0.234	0.819	
Understanding of SDG	0.341	0.267	0.791

Extracted (AVE) cross the threshold, loadings between 0.4 and 0.7 are considered acceptable (Hair et al., 2017). *Composite reliability* measures the internal consistency.

The results confirm that composite reliability is established, as all the constructs have loadings above 0.9 (Hair et al., 2017). AVE analyzes whether the constructs under study measure what was intended by their use. All the figures are above the accepted criteria of 0.5 (Hair et al., 2017). As such, we conclude that convergent validity exists.

For analyzing *discriminant validity*, we use Fornell and Larker's criterion and the Heterotrait-Monotrait (HTMT) ratio of correlations. In Fornell and Larker's (1981) criterion, the diagonal values should be greater than other constructs. Table 4 shows that the set criteria is met by the constructs under study. Per the HTMT ratio, the value of each construct should be lower than 0.9 (Henseler et al., 2015) to ensure discriminant validity.

As per these measures, the measurement model is reliable and valid and as such further analysis of hypothesis testing can be undertaken.

Tables 4 and 5 show the results of discriminant validity analysis by Fornell-Larcker (1981) and HTMT criterion, respectively, indicating that the set parameters are met.

Table 5 Validity of the three constructs of the study (Heterotrait–Monotrait Ratio)

	Importance	*Lifestyle impact*	*Understanding of SDG*
Importance			
Lifestyle impact	0.215		
Understanding of SDG	0.323	0.235	

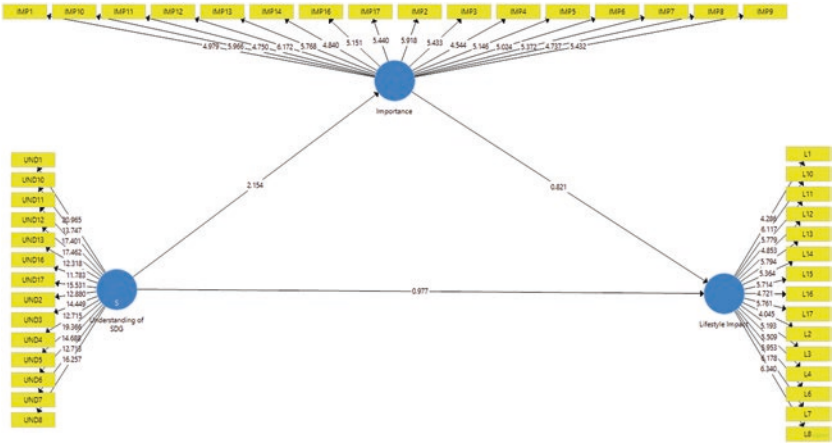

Fig. 4 Structural model

Discriminant Validity

The measurement model that PLS SEM analyzes indicates that all the constructs adopted in the study meet the benchmarks. The standardized loadings, composite reliability, and the average variance extracted indicate the reliability of the constructs as well as content validity, convergent, and discriminant validity (see Tables 3, 4, and 5).

Mediation Analysis: We examine the structural model using 5000 bootstraps (Hair et al., 2017) (Fig. 4; Table 6).

Table 6 Hypothesis testing

	Original sample (O)	*Sample mean (M)*	*Standard deviation (STDEV)*	*T Statistics (|O/STDEV)*	*P Values*
H1 Understanding of SDG -> Importance	0.341	0.383	0.142	2.403	0.016
H2 Importance -> Lifestyle Impact	0.162	0.204	0.196	0.828	0.408
H3 Understanding of SDG -> Lifestyle Impact	0.211	0.204	0.211	1.002	0.317

7 Discussions, Suggestions, and Conclusion

Youth greatly influence the future of a nation, and 65%, that is, 5.06 billion, of the world population is youth. India as a country has 939,787,340 people between the ages of 15 and 64 years (World Bank, 2020). There is a lot of hope for an improved future. This study analyzes the research model based on Theory U and investigates the influence of perception of the Sustainable Development Goals (SDGs) and the priority given to their achievement on the lifestyle of Business Management students from the Indian state of Madhya Pradesh. Further, it also presents the role of educational institutes as perceived by these management students in attainment of the SDGs.

The mediation results show that perception regarding the importance of the SDGs does not mediate the relationship between an understanding of, and the perception of the impact of lifestyle on, the SDGs. As such, only H1 (that is, an understanding about the SDGs as significantly and positively related to a perception of the importance of the SDGs) is accepted. We expected that this perception of the importance of the SDGs would in turn significantly affect the type of lifestyle that is compliant with accomplishing the SDGs with adoption of pro-environmental behavior such as car-pooling, switching off electrical appliances when not in use, avoiding food and energy wastage, switching to eco-friendly products, reduction in usage of refrigerator and air conditioners to control CFCs, and so on. However, the results countered our expectations. Further, an understanding of the SDGs is also not significantly associated with perception regarding the impact of lifestyle on attaining the SDGs. The results

signify the need to increase society's capacity to resolve intricate challenges urgently, with less than ten years left until the 2030 deadline. Specifically, the SDG's 4.7 target indicates that all learners should acquire essential knowledge and skills to promote sustainable development. When interpreted in the context of Theory U, our results suggest that the future managers who have an awareness of the SDGs are currently in the open-minded zone (see Fig. 1), that is, as the future managers can perceive the SDGs, they are at the seeing stage of Theory U, but they do understand them and hence attach less importance to them. Being at the second stage, they have to go a long way in order to reach the performing stage where individuals will be determined to take actions toward environmental concerns on their own.

A sample of 384 is considered as representative (Krejcie & Morgan, 1970) and the valid sample for our study is slightly less than that, and so the findings cannot be generalized. Still, the findings of the study indicate that students are not particularly aware of the SDGs, which further implies that HEIs should actively increase the SDG-related courses/topics in curricula for the management graduates in Madhya Pradesh so that they include policy-level intervention and promote strategies like green HRM, corporate greening, and so on. This inclusion of the SDG-related content across different domains at a global level will further improve the collective responsibility in accomplishing the SDGs. The respondents suggested the following measures as responses to the qualitative question asked in the questionnaire to ensure accountability of HEIs in accomplishing the Sustainable Development Goals. A summary of the suggestions is presented here:

1. Promoting research in the field of environment and sustainability
2. Organizing workshops for encouraging sustainability and informing participants about the role that they can play
3. Sharing relevant information by means of publications
4. Sensitization activities like rallies, street plays, and dialogue with government and scientific communities
5. Collaborating and networking with agencies working for environment sustainability
6. Competitions to sensitize student community

We propose the following suggestions for HEIs to help accomplish the SDGs by 2030:

Promoting research in the field of environment and sustainability

Research in the areas of sustainability can be promoted by educational institutions by directly acknowledging studies on sustainability issues and concerns. Further, they can be tied to funding agencies which will further motivate other students to take up research in the domain of environment and sustainability.

Organizing workshops for encouraging sustainability and informing participants about the role that they can play.

Taking action leads to better results and thus, involving students with hands-on initiatives and workshops where students can learn their role in, and strategies for, environmental protection by including representatives from agencies working toward environmental concerns would be beneficial. Some small-scale initiatives like plastic free zones can be promoted and such initiatives can even be rewarded.

Sharing relevant information by means of publications

Research studies and case studies pertaining to environment and sustainability should be promoted in the form of publications. Further, educational institutions can introduce a separate page on their website specially dedicated to the green initiatives taken by them. Publications such as research articles, chapters, books, blog entries, and websites should be made open-access and should be readily made available to be read by the general masses.

Sensitization activities like rallies, street plays, and dialogue with government and scientific communities

The role of the educational institution must not be limited to internal systems when it comes to accomplishment of the SDGs. As agents of change, the future managers should be trained to sensitize the public at large. This will not only increase the awareness of the general public but also create a positive public image of the educational institutions working toward these goals. Further, dialogue between government and scientific communities will try to bring stakeholders into the discussion, and thus help in developing common understanding between government, scientists, universities, and society.

Collaborating and networking with agencies working for environmental sustainability

The agencies working in the area of environmental sustainability can contribute in terms of hosting lectures and even provide internships and practical exposure which will help inspire young minds to come up with new initiatives. Such initiatives should be funded and supported by the

educational institution internally or through some external agency for getting due support.

Competitions to sensitize student community

Competitions like debates, poster making, video making, logo making, exhibitions, and so on can all help in sensitizing the student community. These competitions can be organized at local, state, national, or even global levels for a greater impact and also for a better inter-cultural effect.

The findings of this study imply the much-needed pro-environmental behavioral push required to achieve the SDGs can emerge at individual and collective levels with proper education, dialogue initiatives, and networking. This chapter discusses the ramifications of these findings for higher education institutions in India specifically, which can even be projected to the global level. It outlines how educational institutions can implement policies and support activities that might aid students in gaining and bringing essential behavioral changes required to attain the Sustainable Development Goals. Though sustainability research has made significant progress in a variety of fields and attempts have been made to combine environmental, social, and economic sciences, it still has a long way to go toward interdisciplinarity. This chapter adds to the current body of knowledge in this regard by introducing the role of educational institutions in the accomplishment of the SDGs. Moreover, the present research can become a crucial base for future research as it gives critical insight into youth's perception and behavior toward sustainability, sustainable development, and the role of educational institutions in achieving the SDGs.

Appendix

Opinion survey on sustainability

Dear respondents, we are conducting an opinion survey on sustainability. The collected data will be used purely for research purpose. Confidentiality will be maintained; therefore, please be candid in your response.

Thank you for your participation.

Sustainability means "The ability to keep going, as an action or process, without giving way or yielding under a burden or experience," and "the ability of the environment to maintain all its vital natural functions despite the damage and degradation caused by human activity.")

Age

15–20

21–25

(*continued*)

(continued)

Opinion survey on sustainability

26–30
31–35
Other…
Gender
Question Type
Female
Male
Prefer not to say
Area of residence
Question Type
Urban
Rural

Have you heard about Sustainable Development Goals 2030 (The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity.

YES
NO
Understanding of SDGs

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity.

Please read the questions and select the option that best suits your choice—To what extent do you understand the current situation of each goal?		Fully Understand	Understand	Neither	Merely Understand	Not understand at all
1	No poverty					
2	Zero hunger					
3	Good health and well-being					
4	Quality education					
5	Gender equality					
6	Clean water and sanitation					
7	Affordable and clean energy					

(*continued*)

(continued)

Opinion survey on sustainability						
8	Decent work and economic growth					
9	Industry, innovation, and infrastructure					
10	Reduced inequality					
11	Sustainable cities and communities					
12	Responsible consumption and production					
13	Climate action					
14	Life below water					
15	Peace, justice, and strong institutions					
16	Life on land					
17	Partnerships for the goals					
Impact of Lifestyle on the Below-Given Social Concerns						
Please read the questions and select the option that best suits your choice—I think my lifestyle has an impact on the following aspects:		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Poverty reduction					
2	Hunger reduction					
3	Health care and wellness					
4	Quality education					
5	Gender equality					

(*continued*)

(continued)

Opinion survey on sustainability	
6	Access to clean water and Sewerage
7	Accessible and non-polluting energy
8	Decent work and economic growth
9	Industry, innovation, and infrastructure
10	Reducing inequalities
11	Creating sustainable cities and communities
12	Responsible consumption and production
13	Weather care
14	Care of underwater life
15	Care for life in terrestrial ecosystems
16	Peacebuilding, justice, and corruption-free institutions
17	Building alliances to achieve the above goals

(*continued*)

(continued)

Opinion survey on sustainability						
Importance of the Below-Given Social Concerns						
Please read the questions and select the option that best suits your choice—To what extent do you think each goal is important for your daily life?		Very Important	Important	Neutral	Rarely Important	Not Important
1	No poverty					
2	Zero hunger					
3	Good health and well-being					
4	Quality education					
5	Gender equality					
6	Clean water and sanitation					
7	Affordable and clean energy					
8	Decent work and economic growth					
9	Industry, innovation, and infrastructure					
10	Reduced inequality					
11	Sustainable cities and communities					
12	Responsible consumption and production					
13	Climate action					
14	Life below water					
15	Peace, justice, and strong institutions					
16	Life on land					
17	Partnerships for the goals					
How do you think higher educational institutions can help in achieving SDGs?						

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PART III

Innovation and Strategic Development

University Extension Programs to Develop Intellectual Property in the Agricultural Sector of Marginalized Rural Communities in the ASEAN Region

Robert Brian Smith and Mark Perry

1 Introduction

Rural communities in developing economies are often marginalized due to their small holdings, small individual economic impact, inferior seed stock, and competition from large landholders. Sustainable production for subsistence farmers is vital, but they may be resistant to making any changes to their methods of production or crop type. Although many governments have recognized that national growth is dependent on innovation, they have often failed to promote or promulgate innovation into rural communities. However, there is a growing interest worldwide in

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protecting traditional knowledge, genetic resources, plant intellectual property protection, plant variety rights, and geographical indications in an effort to leverage current knowledge and build for future development. In this chapter, we focus on the ten countries which compose the Association of Southeast Asian Nations (ASEAN): Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam.

Universities are also championing innovation as an important source of new ideas for advancing sustainable development, which is seen as a key to maintaining growing standards of living around the world without destroying the planet. This is especially notable for rural universities with faculties of agriculture, who have a critical role to play in this area, both within their local communities and on a broader level for the developing countries they neighbor. There are many areas where extension services could be deployed. On the one hand, universities can help rural communities navigate the maze of intellectual property rights surrounding plant innovation to obtain better genetic sources and exploit other means for sustainable development. On the other hand, they can help communities expand their own innovations for potential intellectual property rights and, where possible, license them for the benefit of the community.

Appellations of Origin (AOs) and Geographical Indications protect producers or manufacturers of goods, including agricultural products, and are discussed in detail in Gangjee (2016). The Geneva Act of the Lisbon System defines a Geographical Indication as an appellation containing the name of a geographical area that designates the origin of that good "which serves to designate a good as originating in that geographical area, where the quality or characteristics of the good are due exclusively or essentially to the geographical environment, including natural and human factors, and which has given the good its reputation" (art. 2[i]) as well as any appellation "which identifies a good as originating in that geographical area, where a given quality, reputation or other characteristic of the good is essentially attributable to its geographical origin" (art. 2[ii]).

The development of Geographical Indications (GIs) and protection of plant varieties in less developed countries are avenues for cooperation between rural communities and universities. The registration of GIs has proven economic benefits to some local communities. Six of the ten nations in the ASEAN have domestic products with Geographical Indications. The issue is not that they lack the products to protect; rather, they need assistance to develop the GIs. In agriculture, this means

defining the geographic region, product development, and specifying the product's unique characteristics.

The ASEAN is home to many indigenous communities that traditionally use herbs and medicinal plants to treat various kinds of illnesses and disorders. Communities require assistance in identifying and evaluating the medicinal properties of these herbs and medicinal plants, the protection of the traditional knowledge, in sustainable production, and in the protection of plant varieties. The goal of universities should be to work together with the local community for the common good and to include the community in the rewards from any commercial production.

Rural communities need to be assisted with the negotiation of rights and with the intellectual property (IP) minefield so that they have access to superior genetic resources at an affordable price. This will improve yields and with outreach services that improve farming practices, will greatly assist such communities in overcoming the poverty trap.

The importance of agriculture in developing economies must not be underestimated. Of the ASEAN countries, Singapore is considered to have a developed economy, Cambodia, Lao PDR, and Myanmar are the least developed economies, with the remainder termed as developing countries (United Nations Committee for Development Policy, 2021). Except for Brunei Darussalam and Singapore, the percentage of the workforce employed in the agriculture, fishery, and forestry sectors is highly significant. In the case of the three least developed members, the agricultural workforce is greater than 40% (ASEANStat, 2020). Therefore, the development of these sectors is a key pillar in their future development.

While significant extension activities are being undertaken in the agricultural sector worldwide, the role of universities, like most of the other providers, is focused on the broader issues of better farming practices (Swanson & Davis, 2014). This chapter focuses on how universities and other providers can assist primary producers to develop and protect their intellectual property rights and to increase the quality and profitability of their produce, with a particular focus on geographical indications.

2 The Issue

The intellectual property protection regime in agriculture is complex as it attempts to balance the rights of farmers against those of plant breeders. "[T]he unauthorized use of patented material may involve the user in patent liability. In the agricultural sector, the potential defendants are;

farmers growing seed with patented DNA; traders in proprietary seed; and research institutes utilizing patented DNA or distributing seed with that DNA" (Blakeney, 2020b, s. 2.5). The sections that follow describe the implications of this issue, providing further details about intellectual property in the agricultural sector, as well as the role of universities in the resolution of the issue.

3 Intellectual Property in the Agricultural Sector

As we will describe in detail, the agricultural sector is subject to a veritable maze of IP treaties and legislation. Discussed below are some of the treaties that are intended to protect farmer's rights and others which seek to protect the rights of developers rather than farmers, such as dedicated plant breeders. The discussion is restricted to the agricultural sector concerned with plants (i.e., members of the Kingdom Plantae).

Agreement on Trade-Related Aspects of International Property Rights (TRIPS)

Members of the World Trade Organization, which includes all ten members of ASEAN, are obligated to implement laws to protect intellectual property rights under article 1(1) of the Agreement on Trade-Related Aspects of Intellectual Property Rights, 2017 (TRIPS). They are free to determine the appropriate method of implementing the agreement within their legal system and practices (art 1[1]). Members must accord the same treatment as set out in TRIPS to the nationals (both natural and legal persons) of the other members (art 1[3]). The TRIPS protections relevant to agriculture are outlined below.

Geographical Indications

A geographical indication (GI) identifies a good as "originating in a member's territory, or a region or locality in that territory, where a given quality, reputation, or other characteristic of the good is essentially attributable to its geographical origin" (art 22[1]). Legal means must be provided for interested parties to prevent the designation or presentation of a good that misleads the public as to its geographical origin (art 22[2][a]) or which constitutes an act of unfair competition (art 22[2][b]). There are additional protections for Geographical Indications for wines and spirits (art 23).

Plant Patents

Patents must be available for any invention in fields of technology regardless of whether it be a product or process (art 27[1]). They must be new, involve an inventive step, and be capable of industrial application (art 27[1]). Patent rights must be available regardless of the place of invention, the field of technology, and country of production (art 27[2]). Members may

> exclude from patentability inventions, the prevention within their territory of the commercial exploitation of which is necessary to protect *ordre public* or morality, including to protect human, animal or plant life or health or to avoid serious prejudice to the environment, provided that such exclusion is not made merely because the exploitation is prohibited by their law. (art 27[2])

Members may also exclude from patentability

> plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes. However, Members shall provide for the protection of plant varieties either by patents or by an effective *sui generis system* or by any combination thereof. (art 27[3])

Unfortunately, TRIPS does not define the requirements of a sui generis system (Repetto & Cavalcanti, 2000). At the time of the drafting of the TRIPS, the International Union for the Protection of New Varieties of Plants (UPOV) Convention was the only extant *sui generis* system, although the TRIPS does not prescribe its adoption. Subsequently, all ASEAN members have enacted their own legislation rather than relying on UPOV (Smith et al., 2023). This issue is discussed in detail in the Food and Agricultural Organization (FAO) Manual on TRIPS (Repetto & Cavalcanti, 2000). The UPOV Treaty provisions are discussed below.

International Union for the Protection of New Varieties of Plants (UPOV) Convention

The granting and protection of breeders' rights for new varieties of plants are a fundamental obligation of the contracting parties to the International Convention for the Protection of New Varieties of Plants, 1991 (UPOV Convention) (art 2). For a breeder to be granted rights, the variety must

be new, distinct, uniform, and stable (art 5). These criteria are described in detail in the Convention (art 6-art 9). Authorization is required from the breeder for production or reproduction, conditioning for propagation, offering for sale, selling or other marketing, and exporting, importing, and stocking for any of the purposes mentioned earlier (art 14[1]). Breeders' rights do not extend to non-commercial acts for private purposes and acts done for the purpose of breeding of other varieties (art 15[1]). The duration of the breeders' rights must be no less than 20 years from the date of the grant except for trees and vines, where the duration must be at least 25 years (art 19). Further discussion about the UPOV can be found in (Sanderson, 2017).

International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)

The ITPGRFA was developed for the "conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising out of their use, in harmony with the Convention on Biological Diversity, for sustainable agriculture and food security" (ITPGRFA, 2001 art 1.1). As we explore below, it is closely linked to the Convention on Biological Diversity (art 1.2). The treaty requires the contracting parties to ensure the conformity of their laws and regulations (art 4). The scope of the obligations includes the "conservation, exploration, collection, characterization, evaluation and documentation of plant genetic resources for food and agriculture" (art 5); and, to develop and maintain legislation and agree on procedures "that promote the sustainable use of plant genetic resources for food and agriculture" (art 6).

Parties are to protect and promote Farmers' Rights, including the "protection of traditional knowledge relevant to plant genetic resources for food and agriculture" (art 9.2[a]); ensuring the equitable "sharing benefits arising from the utilization of plant genetic resources for food and agriculture" (art 9.2(b)); and, ensuring participation in decision making, "at the national level, on matters related to the conservation and sustainable use of plant genetic resources for food and agriculture" (art 9.2[c]). Examples of success stories and best practices are described in Andersen and Winge (2013).

Convention on Biological Diversity

The objectives of the Convention are

> the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding. (Convention on Biological Diversity, 1993 art 1)

Santilli (2012) discusses the interface between agrobiodiversity and the law, while Chiarolla (2011) argues that current global institutional reforms that govern crop diversity are insufficient.

Traditional Knowledge

Over time, farmers have adapted their techniques to local environmental conditions (Kuruk, 2020, p. 51). Similarly, others discovered the medicinal properties of plants and applied that knowledge to promote health and well-being in their community. Kuruk (2020) argues that products and practices based on traditional knowledge are similar to those that can be protected under intellectual property laws (p. 51). The issue is that they must meet the accepted notions of intellectual property such as "ownership, originality, duration, inventiveness and uniqueness" (p. 54).

As of October 2021, the World Intellectual Property Organization has been unable to agree on the contents of an international legal instrument relating to the intellectual property protections that should be provided to genetic resources, traditional knowledge, and traditional culture (WIPO, 2021a). One of the issues is the difficulty of agreeing on a definition of "traditional knowledge," although this may be neither possible nor necessary (WIPO, 2001, p. 25). WIPO has a detailed working definition: The relevant components for the agricultural sector are tradition-based inventions, scientific discoveries, and all other tradition-based innovations and creations resulting from intellectual activity in the industrial or scientific fields (p. 25). The lack of a treaty has been no impediment to developing countries implementing their own domestic legislation. Most of the ASEAN economies have introduced such legislation (see Smith et al., 2023). For instance, in 1999, Thailand legislated its Protection and Promotion of Traditional Thai Medicinal Intelligence Act, B.E. 2542

(1999) and Plant Varieties Protection Act B.E. 2542 (1999). The issues associated with the intellectual property protection of traditional knowledge are discussed in depth by Santilli (2012, Chap. 11), Kuruk (2020, Chap. 3), and Blakeney and Siddique (2020). For instance, a case study by Charoenniyomphrai et al. (2006) investigates indigenous knowledge, customary use of natural resources, and sustainable biodiversity management amongst the Hmong and Karen communities in the mountainous areas of Thailand.

Potential Extension Roles for Universities

Improvement of Agricultural Practices

Chemical deterioration is the major type of land degradation in Thailand, Cambodia, the south of Vietnam, and the northern part of Borneo Island, while physical deterioration is the major mode in the Philippines (Takeshima & Joshi, 2019, p. 4) and deforestation is a major threat in Indonesia. Forested land makes up around 50% of the land area of Southeast Asia, but the rate of forest loss since the 1990s has been between 0.3% to approximately 0.65% per annum (p. 5). The annual reduction of carbon stock in living biomass in Indonesia has been 1.79% per annum since 2000, mostly due to oil palm production.

For the decades of the 1990s and the 2000s, the average annual growth of agriculture value-added fluctuated to around 3% across all Southeast Asian countries (Takeshima & Joshi, 2019, p. 6). In the 2010s, growth slowed down, particularly in Brunei Darussalam, Myanmar, the Philippines, Thailand, and Timor-Leste. Indonesia and Malaysia, however, showed growth during the 2010s of around 4% per annum. All Southeast Asian nations have adopted modern, mostly non-hybrid, varieties of rice; from around 30% in the 1970s to 70% in 2000 (Takeshima & Joshi, 2019, p. 6). Thailand was slower to adopt these varieties due to its focus on aromatic rice. The adoption of hybrid rice has remained low in all Southeast Asian countries (p. 7). Cereal crops, such as maize, have shown a fast adoption of hybrid varieties, as have root crops such as cassava and potatoes (p. 8). Mechanization has expanded across the region over the last few decades with the emphasis on small, low horsepower tractors that are often two-wheeled (p. 9). The use of agrochemicals has increased significantly since the 1960s to the point where there is concern about potential overuse (p. 10).

Irrigation accounted for 22% to 28% of irrigated land from 1993 to 2013, while it remained virtually unchanged at 13% in the maritime states (Takeshima & Joshi, 2019, p. 10). Surface water is the predominant source of irrigation water at over 95%. Salinization in irrigation areas is non-negligible in most of Southeast Asia, estimated in 2018 to be 8% of the irrigated land in Thailand and Vietnam, and 9% in Indonesia (p. 4).

The potential roles for universities in the improvement of agricultural practices are almost limitless. Subsistence farmers need assistance improving horticultural practices to make them more sustainable. The task may be as simple as working with groups of farmers to improve their existing techniques, while at the same time learning practices from them that may be applied elsewhere. One pressing need, particularly in parts of Southeast Asia, is to develop practices to remove the need for burning crop stubble to avoid the very high levels of pollution that impacts many parts of the ASEAN's countries. Innovation is needed to improve crop yields, while at the same time increasing immunity to crop diseases. Salinization needs to be reversed where possible and actions developed to stop its spread, including development of saline-resistant crops. There is a pressing need for the development of herbicides and pesticides that do not imperil the health of rural workers, nor leaving residual compounds that are a threat to users.

Geographical Indications

ASEAN member Cambodia recorded Kampot Pepper as the first GI registered via the Geneva Act, 2015 of the Lisbon System (Lisbon Agreement, 1979) of the World Intellectual Property Organization (WIPO, 2021b). Kampot Pepper is grown exclusively in the provinces of Kampot and Kep and was registered domestically in 2010. According to figures released by the Department of Intellectual Property of the Ministry of Commerce of Cambodia, the impact of registration has been significant (WIPO, 2021b). The average farm-gate price rose from an average of USD 7.50 in the year before domestic registration to USD 22.70 ten years after registration (WIPO, 2021b). At the same time, the value of production rose from USD 70,000 to over USD 1 million. A study highlighting the role of contract farming and the role of the Kampot Pepper Agricultural Cooperative and the Kampot Pepper Promotion Association is described in detail by Thorng and Chao (2016).

As noted in Table 1, six of the ASEAN members have recognized the potential for promoting the geographical indication of products to their

Table 1 Geographical indications registered in the ASEAN Members States as of November 27, 2021

Member	*Total*	*Foreign*	*Domestic*		*Main GI agricultural products*
			Non-agricultural products	*Agricultural products*	
Brunei Darussalam	–	–	–	–	–
Cambodia	5	1	–	4	Palm sugar, Pepper, Pomello, Wild honey
Indonesia	92	9	12	71	Coffee, Fruit, Spices
Lao PDR (Phonevilay 2021)	6	–	2	4	Coffee, Rice, Tea
Malaysia	80	8	33	39	Fruit, Rice, Spices
Myanmar	–	–	–	–	–
Philippines	1	1	–	–	–
Singapore	144	144	–	–	–
Thailand	114	11	31	72	Coffee, Fruit, Rice, Spice
Vietnam	95	1	16	78	Fruit, Rice, Spice

local producers. Indonesia, Thailand, and Vietnam have been the drivers with agricultural products, followed by Malaysia. Interestingly, two of the three least developed members, Cambodia and Lao PDR, have embraced the concept for key local products, thus improving the quality of life of those local communities, whether as producers or providers of labor.

Thailand has the greatest number of domestic GIs in the ASEAN. The ASEAN database has complete details, in English, of each product. Thailand launched its geographical indication registration system in 2004. Subsequently, it launched its One Province One Geographical Indication scheme to develop one GI product for each of its 77 provinces (Department of Intellectual Property, 2013). As can be seen in Table 1, not all are agricultural products. In 2013, the Department issued the second edition of One Province One Geographical Indication (Department of Intellectual Property, 2013), which details ten GI products described in Thai and English. A full list of these is available via (provide source), the products showcased were varied, and include examples such as:

(a) Doi Tung Coffee, Chiang Rai Province northern Thailand—a coffee growing in an area of around 480 hectares in the mountains of northern Thailand at the height of between 800 and 1200 meters. Local hill tribes participate in all stages of the production process;
(b) Phurua Plateau Wine from Loei in northeastern Thailand is grown on a high plateau at 650–800 meters above sea level. The topsoil is a one-meter-deep layer of sandy loam soil. The minerals in the soil and abundant rainfall allow vines to blossom in November and produce fruit during the cool season.
(c) Trang Roast Pork from the southern province of Trang is characterized by its method of roasting and the marination ingredients and
(d) Surat Thani Oyster from southern Thailand is cultivated in Ban Don Bay of Surat Thani Province and has specific physical characteristics.

As well as registering GIs in Thailand, the Department of Intellectual Property registers Thai GIs in foreign countries to provide intellectual property protection in international jurisdictions. By May 3, 2021, six products had been registered internationally by the Department: Thung Kula Rong Hai hom mali rice, Doi Chaang coffee, Doi Tung coffee, and Sangyod Muang Phatthalung rice in the EU; Isan indigenous Thai silk yarn in Vietnam; and Lamphun brocade Thai silk in India and Indonesia (Arunmas, 2021). At the same time, applications have been lodged for Thung Kula Rong Hai hom mali rice, Pakpanang Tub Tim Siam pomelo, and Phetchabun sweet tamarind in China; Doi Chaang and Doi Tung coffee and Huay Mon pineapple in Japan; Phetchabun sweet tamarind and Lamphun golden dried longan in Vietnam; and Thung Kula Rong Hai hom mali rice, Sangyod Muang Phatthalung rice, Pakpanang Tub Tim Siam pomelo in Malaysia (Arunmas, 2021).

Cambodia and Lao PDR have followed a different path. They are party to the Geneva Act of the Lisbon Treaty (Geneva, 2015), where the state parties are able to access a one-stop-shop to register appellations of origin and geographical indications through a single procedure within the World Intellectual Property Organization under the Lisbon Agreement for the Protection of Appellations of Origin and their International Registration, 1979.

The potential roles for universities in the development of GI products will involve specialist with a variety of skills. The key is to determine the characteristics that make a particular product “unique” and distinguish it

from other similar products. In the non-agricultural area, this can be fairly straightforward, where weavers from a particular area use a special weaving technique or have developed a characteristic design. In the agricultural sphere, it is more complex, as it requires the product to be grown in a defined area with a particular geography and soil characteristics. The product must be able to be differentiated from similar products from other areas on the basis of shape, color, taste, or smell. The product must be uniform across its production area.

Traditional Knowledge

Traditional knowledge possessed by indigenous peoples and farmers is important "in identifying biological resources worthy of commercial exploitation" (Blakeney, 2020a, s. 3.5). For instance, in 2018, around two-thirds of the population of India relied on indigenous knowledge of biological resources, with more than 7500 species being utilized for this purpose (Sharma et al., 2018). Agricultural applications include knowledge of local biological resources, animal breeds, and local plant, crop, and tree species (Hansen & Van Fleet, 2007). This knowledge would also identify which plants are indicators of soil salinity. Blakeney (2020a) notes that a significant contribution "has been made by the knowledge of indigenous peoples and farmers in the development of new crop types and biodiversity conservation" (s. 3.5).

The World Health Organization (2019) recognizes the role of *herbal medicines,* which include "herbs, herbal materials, herbal preparations as well as finished herbal products that contain, as active ingredients, parts of plants, other plant materials or combinations thereof" (p. 8). It defines *indigenous traditional medicine* as the sum total of knowledge and practices, whether explicable or not, used in diagnosing, preventing, or eliminating physical, mental, and social diseases. This knowledge or practice may rely exclusively on past experience and observation handed down orally or in writing from generation to generation. These practices are native to the country in which they are practiced. The majority of indigenous traditional medicine has been practiced at the primary healthcare level (p. 8).

Traditional medicine is "the sum total of the knowledge, skill and practices based on the theories, beliefs and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness" (p. 8). The importance of traditional medical

knowledge should not be underestimated, as many of our modern medicines and vaccines are derived from natural resources and the associated traditional medicine (WIPO, 2015, p. 1).

In 2010, the ASEAN published its first compilation of herbal and medicinal plants (Ali et al., 2010). Each of the 142 plants is described by its attributes, including scientific and vernacular names, chemical constituents, reported medicinal usage and whether this is supported by experimental/clinical data, contraindications, and references. A second edition, including 159 species commonly used and consumed for health benefits and preventative properties, was published in 2017 (Sukmajaya, et al., 2017). While reliable data is unavailable, the Secretary-General of the ASEAN, in the foreword to the 2nd edition, opined that "about 1,500 plant species have been widely used for traditional medicines" (p. iii). He considered that

> with this high potential it is expected that ASEAN Member States and people in the region could get benefit from utilizing herbal and medicinal plants for improving livelihood and support healthcare (or the region's population. With reliable policy support, standards, safety. quality and sustainable resources, herbal and medicinal plants can be further explored to support the development of the traditional medicine industry. (p. iii)

To assist the development of the traditional medicine industry within the ASEAN economies, the ASEAN Traditional Medicines Scientific Committee (ATSC) developed Guidelines on Safety Substantiation and Guidelines on Claims and Claim Substantiations (Pramono, 2019). These guidelines developed in 2014 (ASEAN Traditional Medicines and Health Supplements Scientific Committee Meeting, 2014) were incorporated as Annex VII into the draft ASEAN Agreement on Regulatory Framework for Traditional Medicines, which was opened for signature on May 16, 2017.

Roles for universities in the area of traditional knowledge require yet another different skill set. In this context, personnel with people skills that can work with local communities and gain their confidence and trust are required to identify how biological resources are being used in the community and for what purpose. This knowledge will be held with high regard in the community, so it should not be dismissed, but its efficacy must still be tested. It is important to remember that many of the medicines used in the west are based on compounds found in indigenous communities. Once a suitable product has and been sourced, it must be tested

both pharmacologically and for efficacy in its proposed role. Universities can also play a role in product development, production, product registration, marketing, and ongoing support.

4 University Extension Programs in Action

Promoting Development of Herbal Products for Community Health

In southern Thailand, staff from Walailak University worked with a subdistrict hospital to develop guidelines for the development of herbal products to promote community health (Walailak University in Collaboration, 2020). The main activities carried out as part of the project included field visits to survey local medicinal plants and obtain traditional knowledge on the use of herbs locally, as well as the sources of local herbal raw materials. Most importantly, the University project leader conducted a forum with the local community to brainstorm ideas about developing herbal massage oil products. The discussion covered cultivation and collection of the herbs, developing, and processing the raw materials to develop a certified quality product. They also desired to market the product through both online and offline marketing channels.

In September 2021, a workshop was organized to launch "Plai Oil, Liniment, Pain Relief" with members of the community enterprise group established to develop herbal products and the staff of the hospital. The herbs were to be marketed under the brand "Happy Herb: Health and Happiness with Local Herbs." The project team brought the prototype product to the market to be used in the care and rehabilitation of the elderly (Walailak University, 2021). Plai Oil is an extract from a member of the ginger family—*Zingiber cassumnar Roxb.* Its medicinal properties have been reported in the literature (see Leelarungrayub et al., 2017).

Subject to determining the unique properties of the Plai Oil from the local area, it would be possible for the community to apply for GI registration. This will present a new challenge for both the university and the community. The key question is, how does the growing environment differ from that of other potential producers? Otherwise, a trademark should be registered.

Preparing for Registration of Geographical Indication for Mangosteens
Ban Khiriwong is a village in southern Thailand where mangosteen is planted in an area 250–900 m above sea level (Walailak University, 2020). The mangosteens are planted in a garden-style with other plants or other forest plants such as the betel nut (*Areca catechu*) and sataw (*Parkia speciosa*). In early 2020, staff from Walailak University assisted the local community in their preparation of the documentation to register "Khao Khiriwong Mangosteens". The growing area includes planting areas in a number of adjacent local villages. The resultant fruit has characteristics different from those of other areas. Producers believe that this is the result of the fruit being grown in an area with high humidity and shade from trees with full sun and low rainfall.

Outreach Activities to Local Communities
In early 2021 Walailak University conducted outreach activities to primary producers within the Nakhorn Si Thammarat Province (Raise the Ability, 2021). During a two-month period, staff from the university undertook the following activities to assist farmers to produce and manage products efficiently, ensuring safety and quality:

(a) Groups of farmers who grow vegetables, peppers, and guava were encouraged to expand biochemical pesticides to eliminate diseases and pests in a highly efficient, low-cost manner when used correctly.
(b) Fish farmers were provided information on coastal aquaculture development and good post-harvest care practices to meet agricultural best practice. They were also provided with information on coastal marine biology and
(c) Pig farmers were provided with information on good agricultural practice (GAP) to improve product quality, promote pig health, and meet certification standards.

The initial activities were to be followed by incorporating the information into a group management and financial system. In addition, the communities would be assisted with developing their marks both within and outside the local community. The modes would be both online and offline.

5 Conclusion

Universities are by far the best placed institutions to undertake community outreach in this sector. They can provide an integrated "one-stop-shop" for the services that are required. A comprehensive team to support the agriculture sector could include:

(a) Agronomists
(b) Soil scientists
(c) Botanists
(d) Biologists
(e) Water engineers
(f) Chemists
(g) Community development specialists
(h) Pharmacists
(i) Traditional medical researchers
(j) Food technologists
(k) Intellectual property lawyers
(l) Marketing professionals and
(m) Business development specialists

In addition, depending on the community, there may be a need for services such as basic community health, financial management, and work skills. No other organization would be able to draw on all of these resources in-house.

Most importantly, where opportunities exist, the challenge is to be proactive and seek them out. Universities can start out by providing a community service. Later, they may open commercial opportunities where the university can partner with the local community to benefit from the project's success. They should not wait for a sponsor to act.

Sharma (2018), while specifically discussing the relationship between scholars from the Nepali diaspora and local Nepali academics, provides insightful advice on this issue

> Those who are working on the ground may not need or want outside help. In my experience of working … there is no lack of talent, knowledge, or skill among them. Colleagues back home are brilliant, or at least far more knowledgeable about the local context, including its challenges and opportunities. What we should strive to create instead is a positive and healthy environ-

> ment of exchange and collaboration, and that should be done through collaboration and slow, humbling process of learning. (para. 15)

Valuable resources for the undertaking of agricultural outreach services have been prepared by the International Food Policy Research Institute (IFPRI) and the Centre for Research on Innovation and Science Policy (CRISP) who funded the development and publication of Good Practice Notes for Extension and Advisory Services. These were prepared by the Global Forum for Rural Advisory Services (GFRAS) (2016; Davis & Sulaiman, 2016). They are freely available online.[1] The most recently published note was GGP Note #29, in 2017. The philosophy behind the system is the agricultural knowledge and information approach, which emphasizes the two-way links between farmer, research extension, and education (Davis & Sulaiman, 2016, p. 2). The Practice Notes are quite comprehensive and expansive in their topics, covering topics as diverse as the use of mass media such as leaflets, pamphlets, posters and radio, websites and mobile/cell phones; demonstrations, training and visiting systems (T & V); farmers field schools (FFS); Theatre; Videos; and Innovation Platforms. The idea behind the Practice Notes was to consolidate the available information in one place and present it in "easy-to-understand formats" (Posthumus & Wongtschowski, 2014, p. 1). To further assist those wishing to develop effective agricultural extension services, GFRAS has also developed a learning kit to assist in the capacity development of extension workers in the agricultural sector, which is also available online.[2]

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[1] These resources can be found at www.betterextensions.org

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Turning Climate Mitigation Concerns into Institutional Sustainability: Using Carbon Accounting as a Tool for Resource Management in a Desert Environment

Khaled Tarabieh and Sherif Goubran

1 Introduction

The term "Carbon Footprint" (CF) has been the subject of interest and debate among environmentalists and scientists worldwide for the past few decades. Greenhouse gases are defined as gases that trap heat within the atmosphere and include carbon dioxide (CO_2), methane (CH_4), and hydrofluorocarbons (HCFCs), among others. The scientific community focuses research on CO_2 concentrations more than on other greenhouse gases due to the gas's abundance in the atmosphere and Global Warming Potential (GWP). The greenhouse effect is defined as the process by

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which radiation from the sun is trapped in the earth's atmosphere and warms the surface. CO_2 is the main component of the greenhouse effect; without it, there would be no sustained life on earth. While the planet is defined as a closed system, meaning the total carbon stock has remained unchanged—be it in solid, liquid, or gaseous form—the growth of industry and subsequent globalization has led to fossil fuels being extracted from the earth at a rapid rate. Burning fossil fuels, such as coal, crude oil, and natural gas for power generation releases excess CO_2 into the atmosphere and amplifies the greenhouse effect. The amplification of the greenhouse effect creates global warming or a long-term increase in the average temperature of the earth's climate system. The repercussions of delaying action to reduce greenhouse gas emissions include the risk of cost escalation of goods and services, locked-in carbon-emitting infrastructure, stranded assets, and reduced flexibility in future response options to climate change (IPCC, 2018).

The United Nations' Intergovernmental Panel on Climate Change (IPCC), the leading body for assessing climate change globally, concludes that higher concentrations of greenhouse gases in the atmosphere due to human activity, most notably CO_2, are the predominant cause of recently observed global warming, glacial melt, and rising sea levels. Following the adoption of the Paris Agreement in December 2015, a landmark decision to combat climate change and accelerate the actions and investments needed for a low carbon future, the United Nations called upon the IPCC to produce a special report on global warming. Released in October 2018, the IPCC deduced that limiting global warming to 1.5°C above preindustrial levels[1] would "require rapid, far-reaching and unprecedented changes in all aspects of society" (IPCC Summary, 2018, p. 5). The special report also argues that climate change's various impacts, such as rising global sea levels or melting of Arctic Sea ice, could be lessened or avoided altogether if global warming were limited to 1.5°C in comparison to 2°C.

Currently, global warming has already surpassed preindustrial levels by 1°C. The consequences of this warming are evident in the increased

[1] The IPCC uses 1850–1900 as the reference period to represent pre-industrial temperature (IPCC, 2018).

frequency and intensity of extreme weather events, localized sea level changes, less sea ice coverage. If the world continues to hold a "business-as-usual" mindset and does not implement sustainable development strategies, global warming will continue to increase past 1.5°C. Unchecked global warming above 2°C or beyond would increase the risk of long-lasting or irreversible changes, such as the loss of some ecosystems (IPCC Summary, 2018). If global CO_2 emissions reach net zero in 2055, meaning that the reduction efforts for CO_2 would equal the amount of CO_2 being emitted, the likelihood of limiting warming to 1.5°C is more favorable. However, the emissions of certain countries, such as China and the United States, continue to grow, leading the world into uncertain climate change.

With the dangers of global warming heightening, plans to slow down climate change have been on the political and corporate agenda globally. Egypt is one of the most susceptible countries to global warming, mainly due to uncertainties related to water availability (Wes, 2022). Within the broader agenda of climate change mitigation, carbon accounting, which entails quantifying carbon emissions, is one of the valuable first steps toward making reductions in footprint. Of course, to quantify carbon emissions on the national level, for Egypt, for example, would require calculating emissions for different organizations and institutions. This quantification can help clarify which activities contribute most to the organization's footprint, enabling organizations to benchmark their environmental performance within their sector of activity, track progress and improvement, and above all, can help guide executive decisions that can yield financial, environmental, and reputational benefits (Awanthi, 2018). Additionally, with the rise of environmental policies, organizations (especially large ones) must be prepared to meet the expected regulatory requirements for carbon reduction and to follow more stringent and transparent reporting requirements.

For higher education institutions (HEIs), sustainability has become a major area of interest. Recent ranking agencies have started considering universities' actions in sustainable development and green economy. A recent example is the Impact ranking[2] which ranks university activities

[2] https://www.timeshighereducation.com/rankings/united-states/2022.

based on their alignment with the United Nations' Sustainable Development Goals (2015). While much of the ranking is focused on the universities' academic output, a large portion of the score is still based on the HEIs internal policies and processes. Additionally, recent research has shown that more sustainable and green universities are more competitive and attractive to students. For example, studies have shown that students are more satisfied in HEIs, which boast a green image (Chairy et al., 2019) and are usually more engaged in sustainability skill-building activities, which they perceive as an added value (Dagiliūtė et al., 2018).

One of the first steps to becoming a green or sustainable campus is tracking and managing carbon footprints (CF). For HEIs, quantifying, tracking, monitoring, and controlling environmental footprints are key strategies to institutionalize sustainability in the operation and management of campuses. In addition, the practice contextualizes the environmental footprint of these institutions within the global university network, promotes their sustainability interventions, and internationalizes their practices. Carbon accounting in HEIs is especially important for institutions in developing countries, such as Egypt, where quantifying carbon emissions is not readily practiced nationally. The American University in Cairo (AUC) is one of the first HEIs in the Middle East to take on this challenge. The Carbon Footprint Reports for AUC have provided insights on higher education's carbon and environmental footprint in the hot arid climate region of the Middle East and North Africa (MENA). Most importantly, AUC's Carbon Footprint Reports presented themselves as strategic planning documents, which highlighted key gaps in the operational standards of the campus, and key areas where energy, water, and material resource are not effectively used. Thus, the reports quickly became used to guide decision-making in the operation, management, and optimization of the campus and its facilities and services.

This chapter examines CF in detail, presenting their relevance to HEIs, especially in locations where carbon data is scarce, such as Egypt. The chapter first provides a short overview of the climate challenges in Egypt and the MENA region before presenting an in-depth analysis of CF practices in HEIs and beyond. Then, an overview of AUC's Carbon Footprint report

highlights its major findings since the beginning of the initiative in 2012. The review and data we present highlight how the carbon footprint estimate at AUC's campus helped develop key recommendations that were beneficial for reducing the environmental damages on campus, potentially resulting in significant savings in operational costs (Bull et al., 2011).

2 Regional Challenges in Egypt and the MENA Region

According to the AUC's annual Carbon Footprint Report for the year 2015, "The rising sea levels predicted by climate change models threaten to flood large swaths of the Delta, Egypt's breadbasket, undermining Egypt's food security and threatening the livelihoods of millions of agricultural workers" (AUC, 2015, p. 10). Despite imminent threats from climate change, such as rising sea levels, water scarcity, and food insecurity, Egypt is among the top ten countries with the greatest greenhouse gas (GHG) emission increases.

Egypt's rapid population growth coupled with previous subsidies from the national government may have led to overconsumption and overreliance on fossil fuels. As the largest non-OPEC (Organization of the Petroleum Exporting Countries) oil producer and the second-largest dry natural gas producer in Africa, Egypt has a robust fossil fuel energy sector (African Vault, 2017). Egypt's total GHG emissions were approximately 272 million MT CO_2e per the latest Climate Data Explorer data in 2014. Egypt's GHG emissions are considered the third highest out of all countries in the MENA region, behind Saudi Arabia and Iraq. This is illustrated in Fig. 1. More than 40% of Egypt's GHG emissions come from just two sectors: power generation and road transport. By 2030, it is predicted that national emissions will have more than doubled current levels and will increase faster than population growth.

Simultaneously, Egypt is widely considered a country with the right physical environment to meet a significant portion of its energy needs by utilizing wind and solar power. The power dynamic between Egypt's renewable and nonrenewable energy sectors will shift with the global push for renewable energy resources. Over the past few years, policy changes and the gradual removal of fossil fuel and electricity subsidies have created

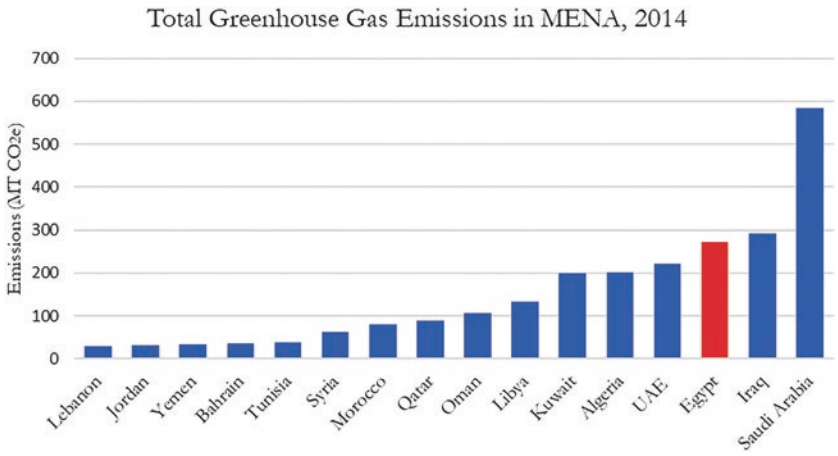

Fig. 1 Egypt's greenhouse gas emissions in comparison to other countries in the Middle East and North Africa region (Climate Watch, 2015)

public awareness and shift in consumption behaviors. Recognizing the potential of the renewable energy sector, the Egyptian government recently announced its ambitious goal of growing the domestic renewable energy sector to 20% of the national electricity grid by 2022. In pursuit of this goal, governmental agencies have partnered with internationally based renewable energy companies, established a net-metering energy tariff, and drafted a standard power purchase agreement for Egyptian organizations to use when purchasing renewable energy. According to the New and Renewable Energy Authority (NREA), Egypt is the only nation in the Middle East that has allocated land specifically for developing renewable energy sources. Egypt is primed to assume a regional leadership position in using renewable energy over the coming decade.

Aside from challenges in the energy sector, climate change poses an immediate threat to agriculture. Warmer temperatures and decreased precipitation in already arid climates, such as Egypt, will hinder the country's agriculture output, potentially impede development, and reduce national crop exports. Projected population growth from 80 million to 98.7 million by 2025 will only put further stress on crop yields and the fixed water output of the Nile River. According to the Ministry of Water Resources

and Irrigation, the country will need 20% more water by 2020 to sustain its population and agriculture, a goal that the country is mobilizing its resources to meet.

In response to the Sustainable Development Goals, Egypt launched its Sustainable Development Strategy (SDS) titled "Egypt Vision 2030." This strategy addresses vital targets and goals in terms of social, economic, and environmental development to be achieved by 2030, and serves as a guiding framework for all national development. Egypt Vision 2030 can be broken into four main pillars: (a) Social Justice; (b) Knowledge, Innovation & Scientific Research; (c) Economic Development; and (d) Environment. The Vision hopes to usher in a new Egypt where the population has access to adequate living standards, healthcare, employment opportunities, and climate change mitigation. To address these concerns, there are concrete goals centered on energy, health, education, and training.

These challenges necessitate organizations, including HEIs, to begin tracking their greenhouse gas emissions to identify possible improvements and carbon reduction areas. The literature analysis presented in the upcoming section offers a synthesis and critique of some studies on the importance of tracking carbon emissions and the various methods of calculating greenhouse gas emissions. It also reflects on some of the recommendations for reducing CO_2 emissions on university campuses.

3 Carbon Footprint Accounting in HEIs and Beyond

In the many studies published on reducing CO_2 emissions and increasing sustainability, one can find a broad range of perspectives as well as in-depth case studies. These works must be studied together to provide a more holistic and comprehensive understanding of which reduction strategies can be best applied.

For HEIs, all campus activities and maintenance contribute to an institution's carbon footprint and reducing these emissions depends on the active participation of its occupants and stakeholders (Hignite, 2009). To better understand each stakeholder's needs, it is important to divide them correctly, as carbon footprint structures vary from one department to another. This highlights the importance of conducting

individual departmental analyses to determine which strategy will best help reduce greenhouse gas emissions (Larsen et al., 2013). For example, in departments more heavily reliant on Information Communication Technology (ICT), Song et al. (2016) suggest that changes in ICT use could help sustainability efforts by reducing the digital presence of the campus.

Studies show that on-campus education and awareness about sustainable development is an integral part of implementing plans to reduce the institution's carbon footprint (Lozano et al., 2013; Lambrechts & Van Liedekerke, 2014). To do so, the HEI must integrate carbon footprint analysis, whether as an education tool for students or as a part of policy development, a process that is outlined by Lambrechts and Van Liedekerke. A case study analyzing a university in Shanghai suggests mapping the consumption patterns and behavioral tendencies of students, then using that data as a reference for how to better engage the campus population with sustainable development projects (Li et al., 2015).

Combining broader perspectives with individual case studies such as this one is an important part of developing successful approaches to carbon footprint reduction. Important case studies we examined include resource consumption-based research from universities in the United Kingdom (Meida et al., 2011), Thailand (Aroonsrimorakot et al., 2013), and Chile (Vasquez at al., 2015). Individual case studies may prove useful to universities in similar environments, and looking at them from developed and underdeveloped regions may assist comparisons across socio-economic and regional contexts. Studies employing a multiregional approach may pave the way for a regional analysis for the ways carbon footprint may vary between different environments within a single country or set of institutions in the same region (Gómez et al., 2016).

Specific case studies also allow for collaboration and attempts at standardization. Geng et al.'s study at Shenyang University (2013) proposes an integrated model for green universities, emphasizing the importance of HEI collaboration with local governments to formulate a detailed plan for the stakeholders involved. Additionally, Klein-Banai and Theis (2013) argue that large-scale interinstitutional collaboration is required to help

reduce carbon emissions on a much larger and thus, much more significant change. Moreover, the benefit of formulating a standardized methodology to assess HEIs carbon footprint would be the elimination of discrepancies and the assurance that all data is collected analogously, which would allow for comparison with similar institutions (Robinson et al., 2018).

Such comparisons could improve ranking systems, such as the GreenMetric Ranking, developed by Universitas Indonesia in 2010, which Ragazzi and Ghidini (2017) argue could benefit from adding thresholds and scoring bands. These systems facilitate case studies and contribute to global awareness of sustainability. On a larger scale, the United Nations' Sustainable Development Goals (SDGs) can help individuals, institutions, and governments naturally gravitate toward policies that encourage environmental sustainability (Mori Junior et al., 2019). Moreover, because the SDGs are applied to numerous countries and regions across the globe, their universality makes it easier to compare different application methods.

Though trend charts may be inadequate as institutions attempt to compare with one another, a composite indicator could overcome this issue (Olszak, 2012). Any methodology or charts developed to address sustainability, however, must be user-friendly, accessible, and easily adoptable in order for them to be widely implemented (Schwartz et al., 2016; Tjandra et al., 2016).

Following awareness campaigns and collaborative studies, HEIs must then actively work toward attaining their goals. When implementing sustainable development plans, within the scope of interinstitutional collaboration, individual HEIs must remember to consider their specific needs when creating carbon emission reduction goals that align with the institution's mission, culturally and financially (Hignite, 2009). Faghihi et al. (2015) argue that there is potential to design sustainable campus improvement program by creating dynamic models that use energy efficiency and conservation (Faghihi et al., 2015). Moreover, by turning again to individual case studies, HEIs can learn how to implement specific, measurable goals according to specific resource conservation.

For example, changes to campus building design can have an impact on energy consumption by using more energy-efficient methods to cut down on lighting and air conditioning (Luo et al., 2017). Energy simulation software is an important tool as it enables the testing of the impact of design interventions on energy consumption. Moreover, Schwartz et al. (2016) highlight the impact and potential of building refurbishment and redesign to minimize carbon emissions in a cost-efficient manner. This would not only result in the reduction of on-campus carbon emissions, but would help to reduce new raw material production, as well as other associated carbon footprint reductions across the supply chain (Cobut et al., 2015).

In these designs, renewable energy and energy optimization are integral factors in reducing their carbon footprint. Onat et al. (2014) show that on-site renewable energy and optimizing energy performance are essential to ensure buildings meet sustainability goals. When analyzing the carbon footprint of electric processes, it is important to contextualize them and consider the hindrances to simulation, such as electricity usage being dependent on immediate need (Marnay et al., 2002). With these considerations in mind, renewable energy in its different forms—solar, wind, hydro, geothermal, and biomass—are potential solutions to help reduce carbon emissions from electricity However, when examining hydroelectric energy, it is important to consider other uses for water sources and how this process impacts resources (Liu et al., 2015). This can be carried out using an environmental framework, where indirect emissions from the water supply, wastewater treatment, and disposal are assessed (Gu et al., 2018).

New tools, models, and methods for tracking, monitoring, and reducing carbon footprint are developed and introduced as a result of specific case studies. These include a compound method based on financial accounts (Alvarez et al., 2014), and a calculator that allows users to examine the different amounts of materials and waste produced on campus (Conway et al., 2008). One important tool relied on by many is the life cycle assessment (LCA), used to examine the entire cycle of a product which "is a unique method to assess the environmental performance of buildings and in decision making in building projects" (Munarim & Ghisi, 2016, p. 235). Evaluating different examples of LCA can also be helpful as expanding research to "include full life cycle contributions and impacts,"

studies can highlight the benefit of reusing and recycling, especially evident in the construction of new buildings instead of refurbishing older ones (Bin & Parker, 2012).

In this study, we use the following tools and frameworks to analyze AUC's CF. The examination of carbon footprint measurement methodologies and exploration of the ecological footprint by Mancini et al. (2016) helps inform this study. Additionally, a brochure issued by the US DOE/EIA provides metrics for measuring and analyzing carbon footprint. Important models include the Green Building Eco-environment (GBE) model, which is used to track and record the existing state and future trend of variation in green building development's eco-environmental impact (Teng et al., 2016). To create a Green Building Eco-Environment System Dynamic (GBE-SD) model, Venism Software was used (Teng et al., 2016). Numerous other tools, such as Umberto NXT and the GHG protocol of ISO 14064, were also implemented to estimate total CO_2 emissions (Singh et al., 2018).

These sources, when studied together, help to inform the process of monitoring carbon emissions and creating effective plans for their reduction. For Egypt, this perspective is especially important given that the country's national greenhouse gas (GHG), or carbon emissions, are the second highest in the MENA region and are expected to increase at a faster pace by 2011 based on a study done by Carbon Group, 2011; Egyptian Environmental Affairs Agency, 2012.

4 The AUC Carbon Footprint Report

The 2021 AUC Carbon Footprint report sheds light on the significance of monitoring carbon footprint in the transition toward a more sustainable, energy-efficient environment. The AUC's series of published reports from 2012 to 2021 discuss how carbon footprint is a good indicator of how human activity influences global warming. Their Carbon Footprint Reports list the annual total of carbon dioxide (CO_2) and other significant greenhouse gases produced because of daily on-campus operations and activities measured in metric tons (MT CO_2). The report exemplifies that investing in investigating the carbon footprint of HEIs is both important and rewarding.

The authors position this report, and the investment in carbon accounting at AUC, as one of the first steps in the mitigation of the potentially disastrous consequences that global warming could have on Egypt and the university's duty. They also highlight the commitment of their institution to the goal of contributing innovative research to the field of sustainability. Finally, this study acts as a base for AUC's desire to make its operations more efficient and sustainable.

In the first report, published 2012, the carbon footprint of AUC's New Campus was closely tracked and recorded for the academic year 2010–2011 (AUC, 2012). The study showed that 90% of the carbon produced by the university operations is mainly attributable to HVAC systems and domestic hot water (about 40% of emissions), transportation (about 31% of emissions, with very high emissions due to the use of private cars), lighting, and the electricity of other nonlighting and electrical equipment (22% of emissions). The average total emissions per full-time-equivalent-students[3] for that year was 9.3 MT CO_2e. The main recommendations in the report included:

- Adjusting the cooling and heating temperature for HVAC
- Pausing HVAC equipment when spaces are not being used
- Diversifying energy sources (to include solar photovoltaic and thermal systems)
- Encouraging the use of AUC transport buses or public transport, to reduce private car ridership
- Improve operational efficiency of bus fleet
- Equipping spaces with automatic motion sensors to ensure lights are turned off when not in use
- Mandating double-sided printing
- Using recycled water for irrigation

The report published in 2015, summarizes the historical data when it comes to greenhouse gas emissions for the academic years 2011–2013 and 2013–2014. The report summarizes the carbon footprint results in graphs and tables, making it easier for readers to comprehend. The report showed that the implementation of the recommendations from the previous reports resulted in reduction of 1611 MT CO_2e (or approximately 4.25%)

[3] Calculating by dividing the average total emissions of the campus for a given year by the number of students. While the full-time-equivalent-student (FTE) calculation standardizes students' actual course load against the full course load (15 credits per semester).

from the 2012 levels. Some components saw significant reductions such as HVAC (-22%), water (-25%), and paper (-21%). However, transportation and emissions due to the use of refrigerants increased by 25% and 13% respectively. The average total emissions per full-time-equivalent-students for that year was 6.1 MT CO_2e, a reduction of more than 30% from the 2012 years. While the overall reduction was small, the increasing number of enrolled students highlight the importance of the recommendations and sustainability initiatives that the university applied. The study still showed that 95% of the carbon produced by the university operations is mainly attributable to HVAC systems, domestic hot water, transportation (especially private cars), lighting, and the electricity of other nonlighting and electrical equipment. Based on these findings, the report suggested a series of recommendations including:

- Improving HVAC Schedule to actual match class and space usage
- Diversifying energy sources (to include solar photovoltaic and thermal systems)
- Improving incentives for using AUC transport buses or public transport, to reduce private car ridership
- Reducing HVAC water usage through recirculation
- Use of native plants, which commonly use less water, to reduce irrigation water consumption

In the most recent report, published in 2021, the university reported a total reduction from 2012 levels of about 19% (8145 MT CO_2e), with all categories seeing reductions ranging from 22% to 51%. The average Total Emissions /full-time-equivalent-Student for that year was 3.9 MT CO_2e, a reduction of almost 58%. The categories of emissions were further broken down to include solid waste management and use of fertilizers. A comprehensive study on the effect of transportation on CO_2 emissions was also established; the rise in the emissions was mainly attributed to commuting by buses and cars. Figure 2 shows an illustrative summary of the report, and Fig. 3 shows the Total Emissions /full-time-equivalent-Student in MT CO_2e for Academic Years (AY) 11 to AY20.

The findings indicate that there was a significant drop in emission in 2020, which was mainly attributed to slowed down or partial operations during COVID. Thus, the data reported for that year was contingent on the remote learning conditions that were enacted for almost half of the report period (i.e., from March 2020). Based on this, the authors

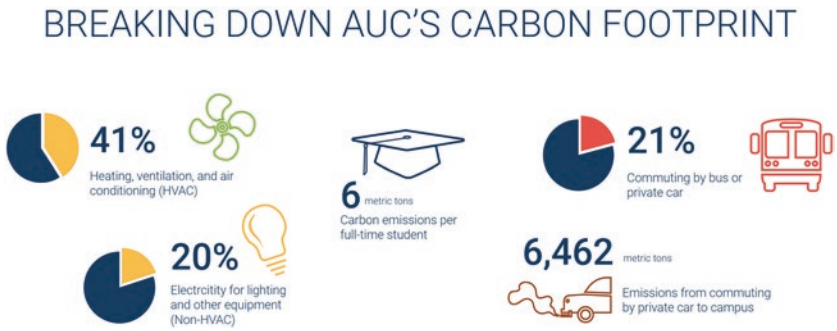

Fig. 2 Illustrative summary of the 2021 AUC Carbon Footprint Report (AUC, 2021)

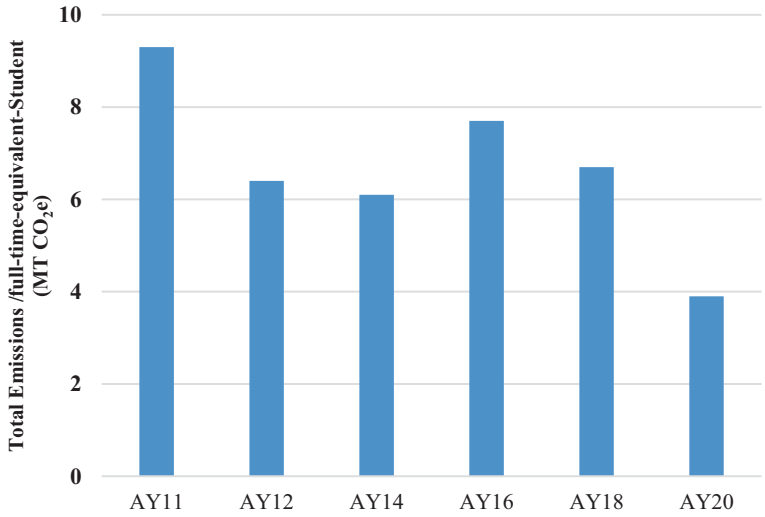

Fig. 3 Total emissions per full-time-equivalent student, AY11 to AY20

modeled the forecast for future emissions on the institutions, considering possible future teaching modality scenarios: continuing the hybrid model with 50% campus utilization or returning to full face-to-face instruction. A third alternative expects a return to full face-to-face modality, but with increased health considerations, such as adding more filtration. Each

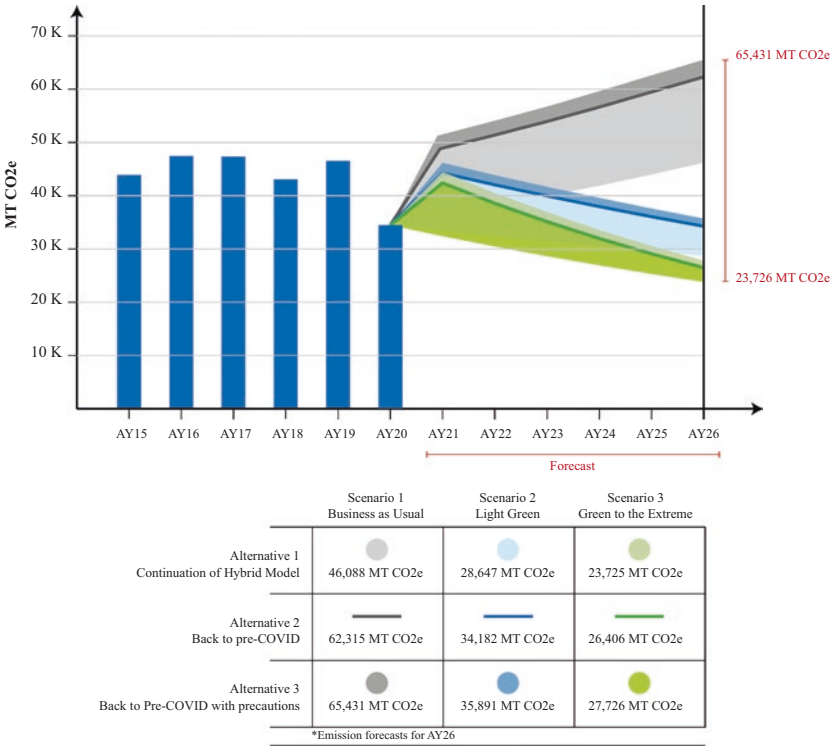

Fig. 4 AUC emissions forecast (AUC, 2021)

alternative is accompanied by three scenarios of carbon emission reduction (light to dark green). These forecasts are presented in Fig. 4. Maintaining AY20 carbon emission levels with an on-campus teaching modality (Alternative 2) by adopting the Light Green Scenario is required. In fact, even with a hybrid teaching modality (Alternative 1), the business-as-usual scenario would return AUC's emissions to its AY19 emission levels (at around 46,000 MT CO_2e). Investing in green solutions could help significantly reduce the emission of the institutions below 30,000 MT CO_2e in all modalities within 6 years.

The American University in Cairo aims to address goals set forth by the Egypt Vision 2030 (Ministry of Planning and Economic Development, 2020) in subsequent Carbon Footprint Reports. The Sustainable

Development Strategy (SDS) has followed the principles laid out by the SDGs as a general framework for improving the quality of life and welfare, considering the rights of new generations for a prosperous life. In addition, the SDS is based upon the principles of "inclusive, sustainable development" and "balanced regional development," emphasizing full participation in development and ensuring its yields to all parties (Ministry of Planning and Economic Development, 2020). Overall, the strategy considers equal opportunities for all, closing development gaps, and efficient resource use to ensure the rights of future generations. Within this report, each chapter corresponds to various SDGs to solidify AUC's commitment to global sustainability efforts. This correspondence will examine the critical role of higher education in achieving and implementing the SDGs. The SDGs also elevate the information communicated through the Carbon Footprint Reports to a national and international scale and provide access to a broader audience outside the scientific community.

Thus, AUC's attempt to reduce its carbon footprint aligns with many of the 17 SDGs adopted by the United Nations in 2015. The goals illustrated provide a holistic approach to looking at the full spectrum of global challenges, including poverty alleviation, water sanitation, global education, and economic growth. Now, three years after their adoption, the SDGs serve as a benchmark toward which participating nations worldwide can strive for. Likewise, the private sector has stepped up its efforts to aid nations in achieving the SDGs by researching environmental issues and funding sustainability initiatives. Through collaboration between all sectors of society, we can end extreme poverty and hunger, fight socio-economic inequalities, address climate change, and ensure that no one is left behind.

5 Conclusion: Utilizing Carbon Footprint Reports as Strategic Planning Tools

Higher education institutions are perfectly situated to be the leaders of decarbonization in the future. Their educational role, research, and potential for community outreach allow for experimentation and showcasing of technologies and methods that would have a great impact if other institutions are to follow. A critical factor is an institutional capacity of faculty,

students, and staff to act as leaders in the community. The sustainable campus is no longer regarded as an educational objective but as a key strategic objective that not only carries operational efficiency and cost savings benefits but provides marketing and positioning power against other institutions in the future. With looming climate change challenges in water, energy, and resources, higher education institutions can use carbon footprint reporting to align their future growth and educational mission with the SDGs and national/regional objectives. As a result, the need for smart projections of carbon emissions will be a must to achieve higher levels of climate neutrality.

Some key recommendations could be extracted based on the experience of carbon accounting experience at AUC. The recommendations, summarized in the list below, could be beneficial for HEIs' administrators and operators who are launching new CF programs on their campuses or trying to improve their CF processes.

1. "You cannot manage what you cannot measure"; the quantity, quality, and data integrity are a must.
2. Institutionalizing the data collection and unit-to-unit commitment for data compilation is critical
3. Creating partnerships across the academic departments is critical for success.
4. The linkage to sustainable development goals allows for disseminating knowledge in line with global benchmarks and key performance indicators.
5. Institutional commitment and integration of sustainability in the curriculum are vital to the success of a sustainability agenda in the short and long term.

Appendix: Summary of Literature Review

Source/ Topic Covered			*Importance of Monitoring Carbon Footprint*	*Green House Gases Emissions in Egypt*	*GHGE International Case studies*	*Methods for Measuring Carbon Footprint*	*Comparative analysis of Energy Use Intensity (EUI) or Emissions Factors*	*Comparative analysis of Carbon Emissions*	*Calculations / Unit Conversions*	*Analyzing Activities contributing to Carbon Emissions*
Title	*Author*	*Year*								*HVAC and Domestic Hot Water*
AUC's Carbon Footprint Report	Mansour, Y., Tarabieh, K., Goubran, S., Krisanda, S., & El-Ghandour, S.	2021	•	•	•	•	•	•	•	•
Decision-making tools for evaluation the impact on the eco-footprint and eco-environ mental quality of green building development policy	Teng, J., Wang, P., Wu, X., & Xu, C.	2016	•		•	•			•	
Implemen ting multi objective genetic algorithm for life cycle carbon footprint and life cycle cost minimi zation: A building refurbi shment case study	Schwartz, Y., Raslan, R., & Mumovic, D.	2016	•		•	•			•	•
Ecological Footprint: Refining the carbon Footprint calculation	Mancini, M. S., Galli, A., Niccolucci, V., Lin, D., Bastianoni, S., Wackernagel, M., & Marchettini, N.	2016	•			•		•	•	
Framework and methods to quantify carbon footprint based on an office environment in Singapore	Tjandra, T. B., Ng, R., Yeo, Z., & Song, B.	2016	•		•	•	•			•
Environ mental feasibility of heritage buildings rehabilitation	Munarim, U., & Ghisi, E.	2016	•		•	•		•	•	

Trans por tation	*Water Supply*	*Refri gerant*	*Paper Use*	*Electri city/ Fossil Fuels*	*Solid waste, Fertili zers, and Biomass*	*Natural gas for domestic & lab use*	*On site Const ruction activities*	*Obstacles in monito ring Carbon emissions*	*Recommen dations/ Methods to reduce carbon footprint*	*Charac teristics of Greenhouse Gas Inventories*	*Sustainable Develop ment and reducing environ mental footprint*	*Life Cycle Assessment (LCA)*
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Source/ Topic Covered			*Importance of Monitoring Carbon Footprint*	*Green House Gases Emissions in Egypt*	*GHGE International Case studies*	*Methods for Measuring Carbon Footprint*	*Comparative analysis of Energy Use Intensity (EUI) or Emissions Factors*	*Comparative analysis of Carbon Emissions*	*Calculations / Unit Conversions*	*Analyzing Activities contributing to Carbon Emissions*
Title	*Author*	*Year*								*HVAC and Domestic Hot Water*
Carbon footprint of a scientific publication: A case study at Dalian University of Technology, China	Song, G., Che, L., & Zhang, S.	2016	•		•	•	•			
Carbon footprint of a university in a multiregional model: the case of the university of Castilla-La Mancha	Gómez, N., Cadarso, M. A., & Monsalve, F.	2016	•		•	•	•			
Calculation of carbon footprints for water diversion and desalination projects	Liu, J., Chen, S., Wang, H., & Chen, X.	2015	•		•	•			•	
Reducing the environmental footprint of interior wood doors in nonresidential buildings e part 2: eco-design	Cobut, A., Beauregard, R., & Blanchet, P.	2015	•			•	•			
Sustainable campus improvement program design using energy efficiency and conservation	Faghihi, V., Hessami, A. R., & Ford, D. N.	2015	•		•	•		•		
Carbon footprint analysis of student behavior for a sustainable university campus in China	Li, X., Tan, H., & Rackes, A.	2015	•		•	•	•	•	•	•
Evaluation of greenhouse gas emissions and proposals for them reduction at a university campus in Chile	Vásquez, L., Iriarte, A., Almeida, M., & Villalobos, P.	2015	•		•	•	•			•

Trans por tation	*Water Supply*	*Refri gerant*	*Paper Use*	*Electri city/ Fossil Fuels*	*Solid waste, Fertili zers, and Biomass*	*Natural gas for domestic & lab use*	*On site Const ruction activities*	*Obstacles in monito ring Carbon emissions*	*Recommen dations/ Methods to reduce carbon footprint*	*Charac teristics of Greenhouse Gas Inventories*	*Sustainable Develop ment and reducing environ mental footprint*	*Life Cycle Assessment (LCA)*
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Source/ Topic Covered			*Importance of Monitoring Carbon Footprint*	*Green House Gases Emissions in Egypt*	*GHGE International Case studies*	*Methods for Measuring Carbon Footprint*	*Comparative analysis of Energy Use Intensity (EUI) or Emissions Factors*	*Comparative analysis of Carbon Emissions*	*Calculations / Unit Conversions*	*Analyzing Activities contributing to Carbon Emissions*
Title	*Author*	*Year*								*HVAC and Domestic Hot Water*
Scope-based carbon footprint analysis of US residential and commercial buildings: An input–output hybrid life cycle assessment approach	Onat, N. C., Kucukvar, M., & Tatari, O.	2014			•	•	•		•	•
Using ecological footprint analysis in higher education: Campus operations, policy development and educational purposes	Lambrechts, W., & Van Liedekerke, L.	2014	•		•	•			•	
Renewable energy: Comparison of CDM and Annex I projects	Kirkman, G. A., Seres, S., & Haites, E.	2013				•	•		•	
Carbon Footprint of Faculty of Environment and Resource Studies, Mahidol University, Salaya Campus, Thailand	Aroonsrimorakot, S., Yuwaree, C., Arunlertaree, C., Hutajareorn, R., & Buadit, T.	2013	•		•		•	•		•
Creating a "green university" in China: a case of Shenyang University	Geng, Y., Liu, K., Xue, B., & Fujita, T.	2013	•		•		•			•
Carbon footprint as a basis for a cleaner Research institute in Mexico	Güereca, L. P., Torres, N., & Noyola, A.	2013	•		•	•	•	•	•	•
Quantitative analysis of factors affecting greenhouse gas emissions at institutions of higher education.	Klein-Banai, C., & Theis, T. L.	2013	•		•	•	•	•		

Transportation	*Water Supply*	*Refrigerant*	*Paper Use*	*Electricity/ Fossil Fuels*	*Solid waste, Fertilizers, and Biomass*	*Natural gas for domestic & lab use*	*On site Construction activities*	*Obstacles in monitoring Carbon emissions*	*Recommendations/ Methods to reduce carbon footprint*	*Characteristics of Greenhouse Gas Inventories*	*Sustainable Development and reducing environmental footprint*	*Life Cycle Assessment (LCA)*
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Source/ Topic Covered			*Importance of Monitoring Carbon Footprint*	*Green House Gases Emissions in Egypt*	*GHGE International Case studies*	*Methods for Measuring Carbon Footprint*	*Comparative analysis of Energy Use Intensity (EUI) or Emissions Factors*	*Comparative analysis of Carbon Emissions*	*Calculations / Unit Conversions*	*Analyzing Activities contributing to Carbon Emissions*
Title	*Author*	*Year*								*HVAC and Domestic Hot Water*
Declarations for sustainability in higher education: becoming better leaders, through addressing the university system.	Lozano, R., Lukman, R., Lozano, F. J., Huisingh, D., & Lambrechts, W.	2013	•		•	•	•			
Measuring carbon performance in a UK University through a consumption-based carbon footprint: De Montfort University case study.	Ozawa-Meida, L., Brockway, P., Letten, K., Davies, J., & Fleming, P.	2013	•		•	•	•			
Understanding and advancing campus sustainability using a systems framework.	Posner, S. M., & Stuart, R.	2013	•		•	•	•			
Measuring buildings for sustainability: Comparing the initial and retrofit ecological footprint of a century home—The REEP House	Bin, G., & Parker, P.	2012	•		•	•	•			•
The Educational Facilities Professional's Practical Guide to Reducing the Campus Carbon Footprint	Hignite, K.	2009	•		•	•	•			
Developing ecological footprint scenarios on university campuses: a case study of the University of Toronto at Mississauga.	Conway, T. M., Dalton, C., Loo, J., & Benakoun, L.	2008	•		•		•	•		•

Transportation	*Water Supply*	*Refrigerant*	*Paper Use*	*Electricity/ Fossil Fuels*	*Solid waste, Fertilizers, and Biomass*	*Natural gas for domestic & lab use*	*On site Construction activities*	*Obstacles in monitoring Carbon emissions*	*Recommendations/ Methods to reduce carbon footprint*	*Characteristics of Greenhouse Gas Inventories*	*Sustainable Development and reducing environmental footprint*	*Life Cycle Assessment (LCA)*
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Source/ Topic Covered			*Importance of Monitoring Carbon Footprint*	*Green House Gases Emissions in Egypt*	*GHGE International Case studies*	*Methods for Measuring Carbon Footprint*	*Comparative analysis of Energy Use Intensity (EUI) or Emissions Factors*	*Comparative analysis of Carbon Emissions*	*Calculations / Unit Conversions*	*Analyzing Activities contributing to Carbon Emissions*
Title	*Author*	*Year*								*HVAC and Domestic Hot Water*
Unit Conversions, Emissions Factors, and other Reference Data	Environmental Protection Agency	2004					•		•	
Estimating Carbon Dioxide Emissions: Factors for the California Electric Power Sector	Marnay, C., Fisher, D., Murtishaw, S., Phadke, A., Price, L., & Sathaye, J.	2002	•		•	•	•	•	•	

	Trans por tation	*Water Supply*	*Refri gerant*	*Paper Use*	*Electri city/ Fossil Fuels*	*Solid waste, Fertili zers, and Biomass*	*Natural gas for domestic & lab use*	*On site Const ruction activities*	*Obstacles in monito ring Carbon emissions*	*Recommen dations/ Methods to reduce carbon footprint*	*Charac teristics of Greenhouse Gas Inventories*	*Sustainable Develop ment and reducing environ mental footprint*	*Life Cycle Assessment (LCA)*
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PART IV

Multi-stakeholder Approaches to Advance Sustainability

Ideas Competitions as Means for Engagement and Dialogue: A Pedagogical Approach for Investigating Socio-Ecological-Technical Practices

Carmela Cucuzzella and Morteza Hazbei

1 Introduction

The development of innovative approaches for teaching sustainable practices in higher education can take on multiple pathways. Participatory design methods and frameworks that empower engagement and dialogue are crucial means to expand pedagogical approaches in design.

In this chapter, we investigate how "ideas" competitions could serve as a pedagogical tool enabling international and local dialogue on key issues of urban design through an inherently collective format. The ideas competition can promote engagement by grouping students, faculty, administrators, community leaders, and municipal decision-makers together in the form of a multi-stakeholder engagement, with the ultimate goal of

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advancing sustainability practices in both the city and in higher education institutions (HEI). It is essentially an exploratory medium for advancing innovative practices (Lipstadt, 1989; Strong, 1996). Moreover, in organizing ideas competitions on an international scale, we can allow a plethora of students (with differing world views) to debate on alternative solutions to common issues that impact all cities (Kreiner, 2010). We propose that ideas competitions can integrate students in the sustainability dialogue and can allow them to propose innovative ideas for a university living lab and be part of an international collaborative design project (Bullinger et al., 2010).

This chapter specifically focuses on an international ideas competition we organized at *CoLLaboratoire*[1] in 2016 for a bus shelter, using it as a case study. We describe the concept of the ideas competition, the specific competition design, the multi-stakeholder governance structure, and the multiple opportunities it provided for collaboration and community visioning. In the conclusion, we highlight some lessons learned from the ideas competitions for Higher Educations Innovations (such as their benefit as pedagogical tools for advancing social engagement, innovative practices, and sustainable practices). Lastly, we elaborate on the potential of international ideas competitions as key pedagogical practices for universities to get international exposure, and we provide recommendations for HEIs to adopt these practices more broadly.

2 *Ideas* Competition

An ideas competition typically occurs when a private or public organizer sends out an invitation to the general public (or to a targeted group) to submit ideas which seek to solve a specific problem or issue within a specific timeline. An idea-reviewers' committee evaluates these contributions and selects the winner(s) (Walcher, 2007). This process usually involves a number of components: the organizer, the timeline, the incentives or prizes, the specification of a problem, the target group, the composition of groups, the media, the evaluation criteria, the idea review, the idea review committee, the complexity of the problem, the context of the problem, and the community needs (Nicolajsen & Scupola, 2020). Criteria such as novelty, relevance, feasibility, and specificity are often used to evaluate

[1] https://ideas-be.ca/project/collaboratoire/.

projects, since ideas competitions typically aim to find innovative ways to problem solve (Blohm et al., 2010; Dean et al., 2005).

The tools used in ideas competitions may be used to rethink, comment on, encourage, and eventually create a new and different innovation orientation (Nicolajsen & Scupola, 2020). These competitions provide for a democratic and transparent innovation process, giving each stakeholder a voice to make comments on, bring up, and rank ideas, which directly influences the overall undertaking. Ideas competitions allow for open communication across communities, raising new values and ideas at a more satisfactory rate, as more often than not, large groups of people provide a greater breadth of ideas than an elite few, no matter how brilliant—groups are better at solving problems, fostering innovation, coming to wise decisions, and even predicting the future (Surowiecki, 2005). Bullinger et al. (2010) highlight what Friedrich August von Hayek (1971) stresses about the importance of competitions for technological and societal progress:

> *As the individual knows little and in particular, because we rarely know who knows something best, we trust in the fact that independent and competitive endeavor of many will lead to things we will ask for once we see them.* (1971, p. 38)

Chupin et al. (2015) have argued that ideas competitions produce "potential architecture." In other words, even if projects are never built, their ideas become inspiration for future projects (i.e., potential architecture). It is this characteristic of the ideas competition that motivates the proposed innovative pedagogical process. Furthermore, this becomes a promising approach for sustainable innovation, since competitions often seek ideas for processes that embrace "out-of-the-box" thinking for design in the built environment.

3 *Ideas* Competitions as Community-Academic-City Dialogue

The ideas competition as a pedagogical device for advancing socio-ecological-technical practices is the basis of many research methods in the design disciplines. The advantage of the ideas competition format is that, along with the evaluation, judgement, ranking process, which provide a democratic and transparent innovation process, the competition format

increases visibility to certain issues as it is often heavily mediatized to reach a broader network of participants (Nicolajsen & Scupola, 2020). We propose that the ideas competition can be a means for open invitation enabling the documentation of new values and ideas.

We can see how the ideas competition format is promising not only for design innovation but for sustainable design innovation as well. If we look at the evolution of sustainable design pedagogy, it has largely involved the teaching of eco-efficiency or eco-innovations (Benavente-Peces, 2019; Figge & Hahn, 2004; Fletcher & Goggin, 2001; Jonas, 1979; Natural Resources Canada's Office of Energy Efficiency, 2016). However, it has become increasingly evident that eco-efficiency alone cannot solve the problem of unsustainability because it lacks any access to the crucial social and cultural dimensions (Cucuzzella, 2009, 2016; Rossi, 2004). When successful, ideas competitions can establish connections between academics, community members, artists, designers, architects, professionals, and business leaders, with the aim of generating a multitude of innovative ideas to more creatively address sustainability challenges in an integrated manner. The generation of alternative, even uncanny ideas through this process, makes it a promising process for deliberating on many imaginative ideas. It should be noted that ideas competitions are not always successful. When unsuccessful, ideas competitions do not achieve a broad reach, have mediocre idea submissions, do not make the connections across the various sectors of community, or awarded entries are highly contested.

Given these benefits, the *CoLLaboratoire*[2] initiative, a university-led unit dedicated to knowledge dissemination research, adopted the ideas competition format for the basis of its research protocol. This research project espouses the premise that using the ideas competition to address community knowledge regarding unsustainable habits can help generate a multitude of innovative ideas; ideas competitions can be emancipatory projects that result in an open dialogue (Jacobsen et al., 2011; Lahiji, 2016).

CoLLaboratoire's main objective was to investigate how public space installations can help heighten community awareness to issues, questions, or solutions in regard to climate change. The initiative aims to examine how the inclusion of communities in places where the installations are embedded can contribute to a deeper collective understanding and embodiment of sustainable urban, professional, communal, and

[2] https://ideas-be.ca/project/collaboratoire/.

humanitarian practices for the long term. Montreal, a UNESCO City of Design—with its hybridity of cultures, languages, urban dynamism, and its leading place in the history of sustainability—is a fertile place for such an experiment in sustainable living. By choosing the iconic Sherbrooke Street in Montreal, a vital artery for the city that has also historically been a center for some of the city's most important cultural initiatives—that is, Corrid'art (Mathieu, 2016)—as its site, *CoLLaboratoire* aims to stimulate Montreal's collective intelligence by helping people recover memories of place and environment on Sherbrooke Street in the City of Montreal (Fig. 1). *CoLLaboratoire*'s different design challenges may serve as elements of a path to a more sustainable and resilient future.

The broader societal impacts of the project are foreseen to include greater networks for mobilization at the community level, a better practical understanding of sustainable technologies for the public, the creation of potential product commercialization opportunities, and the development of toolkits for effective participatory design practices.

We have organized a series of competitions through the *CoLLaboratoire* initiative, which have been published in the Canadian Competitions Catalogue.[3] The cataloguing and archiving of the ideas from a competition, whether they spawn from winning entries or not, creates a public dialogue between architects, designers, businesses, procurement departments, and the general public. The ideas competition is a means to develop public engagement and awareness on some issue, in this case, the issue was that of the unsustainability of urban mobility (Lahiji, 2016).

So far, the three competitions[4] developed through the *CoLLaboratoire* initiative have helped researchers reflect on how architecture and spatial practices—through their structures, formal qualities, and representational approaches—enable designers to creatively address questions of climate change. All three competitions were targeted at design, architecture, landscape, and urban students around the world. Universities everywhere used these competitions as a pedagogical exercise, since the questions put forth in the competition design brief were pressing regardless of location. The global reach of these initiatives allowed for the opportunity to understand

[3] https://www.ccc.umontreal.ca/index.php?lang=en.

[4] Carmela Cucuzzella (2015), "Projects of the IDEAS Research Chair and the Collaboratoire Initiative," Concordia University, https://ideas-be.ca/project/collaboratoire-solar-powered-bus-shelter/; https://ideas-be.ca/project/collaboratoire-more-than-waiting-for-the-bus/; https://ideas-be.ca/project/competition-reimagining-public-transport/.

Fig. 1 The urban corridor of Sherbrooke St. looking east on Sherbrooke Street from Redpath Street: (Top: circa 1940, Bottom: 2020), © Creative Commons

how young minds from differing cultures and world views would address the problem. In the most recent competition,[5] over 500 students participated.

These experiments (communal, academic, and pedagogical) facilitated the conception of unconventional designs for the relevant urban installations. More importantly, these types of challenges allowed for a bridging of the gap between different modes of knowledge, (e.g., between the general community and academics). There is a pressing need for the institutionalization of sustainable practices and for a move toward more sustainable cities. Additionally, through potential future implementation in the city, these projects can become not only a cultural production for the community but elements of a living lab that help transfer practical knowledge about innovative technologies and sustainable practices.

4 The Need for Generating Progressive Ideas Given the History of Sustainable Practices

Since the 1960s, designers have been working ardently to address the pressing and complex environmental questions of their time. In the 1960s, the drive toward holistic approaches of public and individual human settlements gave rise to the idea of environmental design as a means to transcend the boundaries between various design disciplines (i.e., architecture, landscape, urban and product design) (Rapoport, 1969). This first "environmentalism" culminated, among other manifestations, in the formation of the *Environmental Design Research Association* (EDRA) founded in 1968.[6] In the 1970s, environmentalism started to shift toward an ecological ideology that would soon be dominated by technical solutions (Jonas, 1979, 1985). This shift coincided with the energy crisis; therefore, environmental design began to abandon the holistic approach in favor of new methods that would help designers reduce energy used in all phases of their designs. This technological turn initiated and improved upon methods looking to constantly maximize efficiency, but it did so without much reflection on the consumption habits that were being encouraged (Fletcher

[5] Carmela Cucuzzella (2015), "Projects of the IDEAS Research Chair and the Collaboratoire Initiative," Concordia University, https://ideas-be.ca/project/competition-reimagining-public-transport/.

[6] Amos Rapoport (1969), Environmental Design Research Association, http://www.edra.org/content/history.

& Goggin, 2001). At the turn of this century, the technological emphasis on efficiency, which developed systematically throughout the 1980s and 1990s, started to reveal its limitations (Cucuzzella, 2009; Papanek, 1995; Rossi, 2004).

Even though this history is not linear, we can identify *three general stages*: environmental design as holistic practice (1960s), the technological turn (1970s), and the normative turn (1990s) (Cucuzzella, 2019). The normative approaches to urban sustainability represent a top-down approach to addressing sustainable design. Since the 1990s, achieving sustainability in the built environment has most often been associated with environmental management approaches because of their ability to assess specific eco-efficiencies, energy performance optimizations, or improvements in buildings and infrastructures (Huppes & Ishikawa, 2007; Preiser et al., 2015). The effectiveness of strict adherence to these approaches, however, was called into question (Alcott, 2008; Herring & Roy, 2007; Madlener & Alcott, 2006; Sorrell, 2007). We categorize here the limitations faced by the emerging methods and tools developed at the time. These limitations to address both global and local environmental degradation can be attributed to three general areas.

First, the prescriptive or normative nature of the earlier tools left little room for profound exploration in innovative solutions. We have observed that with sustainable architecture projects for public buildings, it is the tried-and-tested proposals that are provisioned rather than more experimental ideas (Cucuzzella, 2016).

Second, their predisposition to fragment the given problem through very rigorous and numerous analytical tools for the various portions of the project results in very little thought being given to the encompassing situation (Farmer & Guy, 2005; Farmer, 1996). This disconnect between the analyses of the many parts and the whole project has been problematic, especially in terms of synergies and coherence.

Third, the profound problems facing humanity cannot be solved through technology alone, since we can no longer ignore questions of degrading social or cultural conditions (Benaim et al., 2008; Stirling, 2006, 2007). Facing a problematic integration of both social and cultural dimensions, the technological approach has revealed a contradictory opposition between form and meaning, between aesthetics and ethics, and between process and content (Brouwer et al., 2012). Many scholars now underline that these missing inter-subjective dimensions may be

compromising the very idea of holistic environmentalism in various realms of knowledge and action (Fisher, 2008; Spector, 2001).

The ideas competition provides a means to not only generate a multitude of alternative and experimental ideas, but to bring the conversation to the international community. It can even have a didactic role through this enlarged dialogue on key issues through the generation of ideas. The ideas competition becomes a type of expansive learning opportunity within the contributing community as well as to the community in which the ideas are shared (Asif et al., 2004; Engeström, 2001). According to Engeström,

> Expansive learning is initiated when some individuals involved in a collective activity take the action of transforming an activity system through reconceptualization of the object and the motive of activity embracing a radically wider horizon of possibilities than in the previous mode of activity. (Engeström, 2003, pp. 30–31)

If we return to the question of climate change and its projected catastrophic global impacts, a rethinking of some of the predominant international discourses and their limits becomes imperative. We have seen that adopting environmental certifications in a strict manner often leaves innovation and quality in the margins (Cucuzzella, 2013). The ideas competition prioritizes dialogue and collective intelligence and therefore is a promising pedagogical approach for investigating socio-ecological-technical innovations and practices (Jacobsen et al., 2011; Kreiner, 2010). The ideas competition has a long-standing experimental tradition (Lipstadt, 1989), one that is rife with debate and dialogue among a variety of representative stakeholders (Bullinger et al., 2010; Cucuzzella, 2020; Ebner et al., 2009; Markey-Towler, 2019). Given this context, our hypothesis states that the collective and reflective approach of the ideas competition brings together the exchange of a variety of values and ideas, valorizes community intelligence, and sustains a dialogue on the issue. The case study presented in this chapter was unsuccessful in that the ideas generated to reinvigorate the neglected public spaces never reached the ears of municipal officials to become a reality. However, the ideas competition was successful in terms of its international reach, which in and of itself, showed the importance of the problem at hand.

This chapter seeks to determine how the inclusion of the broader international community can contribute to a deeper understanding and

embodiment of sustainable practices for the long term. In the next section, we explore this question by observing the diversity of outcomes of CoLLaboratoire's "More Than Waiting for the Bus" ideas competition.

5 *Ideas* Competitions as Key for Collaborative Design

The "More Than Waiting for the Bus" competition was launched in 2017 and it centered on generating ideas about how to render public transport more enticing. It asked students from around the world how they would think about designing the spaces surrounding bus stops. These spaces are often neglected and have the potential to be animated in innovative ways. We selected four specific sites located in the east end of the city of Montreal as the spaces for the submitted ideas. This ideas competition also sought both ideas and principles, more specifically: (1) drawings of innovative ways to reinvigorate the spaces surrounding the bus stops, and (2) a series of written design principles adapted for the future planning of sites surrounding bus stops. The principles aim to generalize the underlying approach of the ideas.

The fundamental idea was to use the space in ways that would inspire citizens to use the bus all year long. The question we asked in the design brief was: What if the public spaces surrounding bus stops are used in ways that inspire citizens to change in some way, while waiting for the bus? These spaces are everywhere in the city as there are more than 8000 bus stops in Montreal. The expectation was that the submitted ideas would contribute to urban sustainability by proposing ways to enhance the public transport experience, engendering urban sustainability and reducing carbon emissions through the potential increased use of the public transit system. Students could submit to a single site or to all four sites. One winner was selected for each site, as each site presented very different urban problematics regarding small neglected spaces.

This ideas competition provided many opportunities to connect with the local community and international student populations. This is the basis for the *CoLLaboratoire* initiative ideas competition format to mobilize international and local actors and build strong networks. At the local level, we organized a series of meetings that were recorded and shared on social media for a larger dialogue among students that wanted to contribute ideas. These exchanges between local and global communities enabled

rich debates about the dire need of intervention and the terrible state of the original sites. Furthermore, these dialogues enabled the exchange of a variety of values across the local community. This local–global dialogue was the first of four opportunities for community exchanges.

The second opportunity for exchanging ideas was the actual ideas submissions by the international community of students. The competition received over 96 projects by 72 teams from more than 20 countries. Overall, the projects explored environmental questions in many ways, including modularity, playfulness, urban place making, seasonality, information and knowledge transfer, ease of deployment, flexibility, conservation of nature and structures, exploration of the senses, security, and water management. For site 1, the winning team presented a system of highly elegant, flexible, and easily deployable reading cabins which could be used year-round. For site 2, the winning team proposed an adaptable and interactive luminous forest. For site 3, the winning team presented a unique project that integrated the issue of municipal water management into the bus stop site and proposed to mitigate its considerable environmental implications. For site 4, the winning team proposed a full-body experience that could operate at the scale of the site (Fig. 2).

Fig. 2 The winners for each of the four sites: top left: Site 1; top right: Site 2; bottom left: Site 3; bottom right: Site 4. © Carmela Cucuzzella + Jean-Pierre Chupin 2021

These ideas were evaluated and judged by a panel comprised of academics, community leaders, citizen representatives, municipal leaders, architects, and urban planners. We show the winning entries for each of the four sites in Fig. 2. Since we asked the competitors to submit drawings and the design principles underlying their ideas, the entries to this competition aimed to construct a debate on how to best increase public transport use. The principles were a topic of discussion and debate in terms of selecting the winning submissions. Therefore, the third opportunity for dialogue was among the diverse set of evaluators that comprised the jury.

In order to honor the winners (as well as all the entries to this ideas competitions), we organized a presentation of the winners and honorable mentions that took place with a simultaneous exhibition of all the entries.

The selected ideas won, not only for their innovative design but for the generalizability of the principles they proposed. Thus, the evaluation of the submissions considered each project's innovative approach, its potential for sustained interested in the renewed activity it proposed, and the generalizability of the principles it suggested for the broader community.

6 *Ideas* Competitions as Key Community Visioning Devices

What was the aftermath of the ideas and principles from this ideas competition? How did new findings arise from this body of knowledge? It must be highlighted that the competition ultimately provided a means to construct a public debate on how to best increase the use of public transport in Montreal.

This format of the competition, which considered both ideas and their principles, made it possible to design a "journey of ideas," addressing issues such as the afterlife of the many ideas after the competition event was over or the transposing of these same ideas from one project or context to another. For example. the ideas from the competition were materialized in the form of an ideation game which we developed with the drawings and principles of submitted projects. This Stakeholder Ideation Game (SIG) is intended for community and municipal planners and aims to encourage non-architects to imagine and discuss the various ways in which they can design public spaces in Montreal. We organized the SIG in three main levels of play.

We used the drawings of unbuilt architecture as illustrations of potential programs. Competition panels were deconstructed and reassembled along three levels to create the game. The first level is comprised of the basic features from which we extracted singular ideas. The second level is comprised of a series of combined features, composed of at least two types of ideas. This enables participants to mix and match combinations of features together to create more complex site designs. Lastly, the third level is comprised of the full spatial compositions detailed by the complete, submitted drawings (Fig. 3). These full spatial compositions are included in case some participants require guidance for developing more complex compositions in their designs.

Citizen organization representatives, municipal authorities, and the general population can employ the Stakeholder Ideation Game (SIG) as a method to stimulate debate and dialogue regarding the design of specific urban sites. Eventually, the drawings and principles generated through the game become elements of deliberation and are used in the exchange of

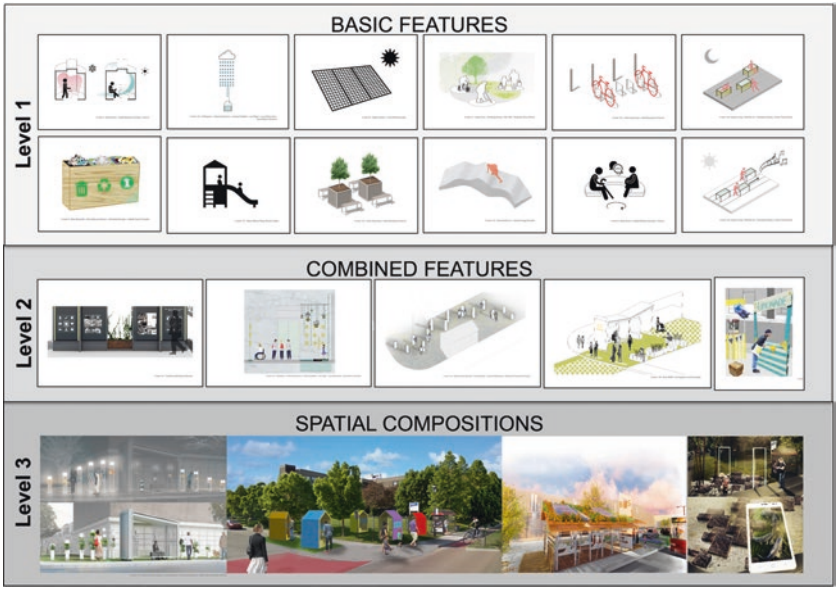

Fig. 3 The three conceptual levels of the proposed game of public space ideation for non-designers. © Carmela Cucuzzella + Jean-Pierre Chupin 2020

ideas, allowing non-architects to illustrate their plans using architects' drawings. This particular version of the SIG board game used printed drawings. We developed a game based on three levels. The hypothesis was that if we started with simple elements and escalated the complexity of the ideas through the next two levels, this would enable participants of the game to become deeply engaged in the emergence of new ideas founded on components of the ideas from the competition. We saw that the three different levels of detail in the drawings helped to accelerate the emergence of new ideas among actors involved in the design process. These new ideas were the outcome of drawings of previously generated unbuilt projects of this ideas competition—which were drawings representing ideas vastly different from the questions we developed with the participants of the game. The expected outcome of this first SIG encounter was the development of a preliminary program for the design of public space. Thus, the renewed embodiments of the original ideas from the "More Than Waiting for the Bus" competition could live on as key ideas in the brief of a new call for urban design proposals.

In a final effort to generate another form of dialogue, we studied how we could translate and retranslate the ideas embedded in the drawings and texts of competition proposals to create new ideas and core elements of knowledge exchange. We intended to explore a possible fifth stage of sustainable design practices. What was fascinating about the process was the ease and excitement with which the participants used the three different levels of drawings to develop a variety of innovative combinations of sustainable features. With great ease and fun, participants combined diverse design elements (through the selection of different cards) that may not have typically been chosen together.

We also collected the most promising principles and ideas and published them into a guidebook, in 2021 (Cucuzzella et al., 2021). This guidebook includes the best ideas and principles, and it categorizes them into sections focusing on social, cultural, well-being, environmental, and technological aspects. This guidebook was made freely available to the city and its citizens as a social project to enable further dialogue at the local level, which further rejuvenated other small neglected public spaces. This was the fifth opportunity to engage the community in a dialogue in an effort to co-design their own public spaces.

We developed this guide for collective use by designers, planners, policymakers, and communities who were interested in designing the sites surrounding urban bus shelters. Figure 4 depicts four pages from this

Fig. 4 Extracts from the Best Practice Guide "More Than Waiting for the Bus," published and openly available (2021). © Carmela Cucuzzella + Jean-Pierre Chupin 2021

guide, each one representing a principle and its corresponding idea. This guide, distributed via open access in 2021, is expected to provide ongoing support to the game and the community.

Throughout this experiment, we considered the comparative nature of the complex duo of "drawing + principles" as crucial for including non-architects in the design process. These principles were categorized to orient our understanding of the potentialities of the ideas into five areas: the social, cultural, ecological, technical, and well-being.

This example of how drawings of unbuilt architecture can allow non-architects to create new ideas is only one of the various ways that competition drawings can find a fertile afterlife. The guidebook provides principles coupled with illustrations offering a basis for a conversation with the community to rethink spaces in other parts of the city or even in other cities worldwide. Original drawings can become cultural products and elements

of a living lab, transferring practical knowledge about innovative technologies and sustainable practices. The recursive translation of ideas using comparative collaborative debate is a key methodology to solve the complex issues that cities must tackle.

7 Conclusion: Pedagogy for Sustainable Practices Through the *Ideas* Competition

This ideas competition sought ideas and projects from international student designers, artists, architects, urban designers, and so on to reinvigorate public spaces surrounding bus stops in Montreal. The chosen slogan, "More Than Waiting for the Bus," invited students to reflect on contemporary approaches that could help invigorate these spaces in interactive, poetic, critical, and meaningful ways: from solely utilitarian to more multipurposed spaces. This community/academic experimentation through public art-architecture installations helped find unconventional ways for design students and community members to better reflect on questions of climate change. Such a project may also uncover some of the contradictions of the prominent practices of what is termed 'sustainable' design today—but this is only observable once the installation is adopted and used by the community over the course of the next few years. Therefore, such a project is not only a cultural production for the community, it also is a living lab, a dissemination project of innovative technologies and uses of technologies. Such a critical practice is key to help bridge the gap of collective intelligence so deeply needed for moving toward sustainable cities.

This case study of the ideas competition for "More Than Waiting for the Bus" was an exploration of just how much the ideas from an international student competition can be used as a source of inspiration for engaging discussions. This is not only for the students globally who contributed to the conversation by taking part in the competition or observing its outcomes, but also it is a resource to encourage ongoing and continuous conversations between the city, the community, and other design and development professionals. This case study became an opportunity to discuss ideas that would not normally be a part of the professional development of the highlighted urban spaces.

Ideas competitions also provide a means to innovate the pedagogy of sustainable practices. They can motivate students to participate in

collective conversations, regardless of how unconventional their ideas may be. These students, who will eventually become industry professionals, will appreciate the power of ideas competitions in generating innovative ideas. Furthermore, the ideas competition as a model combining competition and cooperation is seen as a driver for innovativeness (Bullinger et al., 2010). In this regard, the ideas competition has become an interesting field for both academic and professional pursuits. The practical use of ideas competitions, however, contrasts with the restricted body of academic knowledge in the field (Bullinger et al., 2010). Indeed, in the public sphere, individuals frequently use drawings and words to communicate ideas, if the community adopted and incorporated ideas competitions on a societal scale, the generated ideas could become institutions (Markey-Towler, 2019). Therefore, the incorporation of these devices (i.e., ideas competitions) in the pedagogy of higher education can enable this exchange of ideas both locally and globally, enabling this large-scale dialogue to take place.

In closing, the ideas competition constitutes a powerful observatory for the study of cycles of potentiality. We have outlined five opportunities for debate and dialogue with this ideas competition model. This example of how competition drawings, ideas, and principles can allow non-architects to create new knowledge is only one of multiple forms of the basic elements of design challenges. Even if we haven't fully unveiled their complexity, we have shown how ideas and principles—even losing ones—can present elements of constructive and meaningful conversations about sustainable living. Indeed, this model is promising as a means of teaching innovation for sustainable practices.

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The Engagement Orientation and Its Limits in Nurturing Sustainability in Higher Education

Lukasz Swiatek

Mobilizing the hundreds of individuals who make up the complex institution of a higher education institution (HEI) to take action on a single issue is no easy task, as these institutions are historically sites that foster constructive debate at best, and unproductive disagreement at worst. Indeed, Caston (1977, p. 3) notes, "at the heart of the university purpose are dissent, disagreement, dissonance." The often-turbulent reality of the HEI is different to its ideal (and popular) conceptualization as a place "for caring relations, a sense of community, an atmosphere in which ideas … [are] shared and refined" (Getman, 1992, p. ix). Yet, dissent within the context of HEIs is not necessarily a negative thing. A major report by the Carnegie Commission on Higher Education (1971) memorably highlights the fact that, as dissent is vital in helping to advance thinking and practice, it is essential not only to a university, but also to democratic life more broadly.

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However, tackling the growing challenges connected to sustainability, including combatting climate change and its panoply of negative consequences, requires new levels of collaboration and cooperation from HEI members. These institutions—often viewed as occupying positions of leadership in their societies—increasingly need to model, and share models of, the implementation of successful sustainability efforts (Haddock-Fraser et al., 2018). Stronger action on the part of HEIs and their members to nurture sustainability, in their immediate vicinities and further afield, is especially needed in the wake of the global COVID-19 pandemic. This worldwide health crisis served, on a broad level, as a tragic reminder of the fragility of communities and the ecosystems around them, as well as the complexity of coordinating global emergency responses; more specifically, it also highlighted the fact that the population growth and urbanization contributing to climate change also facilitate "zoonotic spillovers" (i.e., transfers of diseases from wild animals to humans) (Rodó et al., 2021). Without more effective and widespread measures to tackle these problems with sustainable solutions, catastrophic events like pandemics will increase in frequency and scope.

This chapter argues that an "engagement orientation" can help HEIs foster sustainability. Johnston (2018a) defines an engagement orientation as a way of thinking, acting, and bringing about social benefits that entails the deliberate involvement of diverse social actors. HEIs can use this orientation to achieve strategy development and decision-making for organization-wide sustainability that is more successful and longer-lasting by virtue of its inclusion of both multiple stakeholders and their diverse perspectives. Additionally, the orientation enables an organization's funding to be directed toward widely supported activities that emerge from stakeholders' interactions (and that, consequently, have stakeholder approval); as such, the activities have a higher chance of having positive long-term impacts. However, an engagement orientation faces limitations. Specifically, over time, it is impacted by organizational changes, external turbulence, and "executive creep" (Buerkle et al., 2017), which refers to the decision-making of executive management encroaching on the orientation.

To illustrate this argument, the chapter presents original research gained through two methods: a case study of Macquarie University and a conventional qualitative content analysis (of the university's publicly available organizational communication collateral). I chose the case study method because it provides a way of exploring one context in depth and

gaining detailed insights from it that can be applied elsewhere. In other words, this single instrumental case study (Stake, 1995) provides a robust way of understanding the principles that apply from it in other settings (Yin, 1981): in this instance, other HEIs. Macquarie University—a public research university located in Sydney, Australia—provides a rich example of the engagement orientation in action, as well as its benefits and limitations. This chapter employs conventional qualitative content analysis (following Hsieh & Shannon, 2005), as it is the most suitable method for gaining the required insights from the university's publicly available communication collateral. This method involves locating content—words, phrases, and clauses (or sentences)—relating to a topic in texts and allowing "categories and names for categories to flow from the data" (Hsieh & Shannon, 2005, p. 1279). Here, the method has been used to find content in Macquarie University's collateral that shows the ways (in terms of patterns or categories) in which the institution fostered an engagement orientation for sustainability. The goal is not to undertake a detailed textual analysis (to understand meaning-making or the construction of the collateral); rather, it is to locate content relating to the orientation and gain insights into how it evolved. The Internet Archive's *Wayback Machine* (available at https://archive.org/web/) has allowed for the location of collateral that the university had previously published online.

This chapter contributes to existing scholarship on sustainable practices in higher education and, specifically, to current knowledge about the engagement orientation in relation to HEIs and their sustainability initiatives. Although higher education scholarship discusses institutions' engagement in various ways—as for example, Sandmann and Jones's (2019) field-surveying collection of essays marking the 20th anniversary of the *Journal of Higher Education Outreach and Engagement* chronicles—discussions of the engagement orientation are much fewer, especially in connection with sustainability. In this respect, Buono (2017), draws on research from business studies to note the importance of an engagement orientation that serves multiple stakeholders in his discussion of the implementation of the Principles for Responsible Management Education. In a related vein, Haski-Leventhal (2014) highlights the need to consider the engagement orientation of students, as a critical HEI stakeholder group, for a more sustainable world. Beyond these sustainability-related studies, other research—notably, by Dostilio and Welch (2019) and Gale et al. (2019)—encourages community engagement professionals to adopt a democratic engagement orientation for HEI

activities. Alpaydin et al. (2018), as well as Šima et al. (2017), also argue that regional universities need to adopt different engagement orientations for their different local communities. Building on this scholarship allows for further insights into the implications of developing engagement orientations in HEIs, especially in nurturing sustainability. This scholarship excludes research into student engagement, as this is a different area relating to students' learning.

This chapter divides its discussion into four sections as follows. First, I outline the engagement orientation in relation to sustainability. Second, I discuss the implementation of such an engagement orientation, especially in relation to the case study (Macquarie University). Third, I critically examine the challenges and limitations of maintaining the orientation (again, in connection with the case study). Fourth, I conclude by presenting final observations and directions for future research.

1 The Engagement Orientation for Sustainability

To grasp the engagement orientation, it is crucial to understand the broader underpinning concept of social engagement. This term is theorized and practiced in a rich variety of ways. Indeed, different fields take strikingly different approaches to this concept. For example, in the domain of healthcare, social engagement refers to tools for the maintenance of social connections and participation in social activities for health (Bassuk et al., 1999). In educational psychology, it relates to the social interactions in which students engage as part of their academic instruction (Patrick et al., 2007). In gerontology, it describes the involvement of older individuals with productive activity and social networks as crucial components of successful aging (Rowe & Kahn, 1997). These three definitions suffice to illustrate the diversity of approaches that associate to this concept.

In terms of HEIs, the most relevant approach to social engagement relates to organizations and their efforts to build relationships with various stakeholders. Johnston (2018b, p. 20) points out that generating "authentic, appropriate, and timely" responses to all types of social expectations is a priority for organizations. At the same time, proactive and self-benefiting actions are also a priority; in other words, organizations are forever seeking to advance their own visions and goals, and, to that end, continue to build relationships and communicate with diverse parties. For this reason, Johnson defines social engagement comprehensively as a "dynamic multidimensional relational concept featuring … attributes of connection,

interaction, participation, and involvement, designed to achieve or elicit an outcome at individual, organization, or social levels" (Johnston, 2018b, p. 19). All three outcomes are important for HEIs. Even though the achievement of outcomes at social levels (for local, national, and international communities) is increasingly a significant priority for institutions, the achievement of outcomes at individual levels (for students and staff), as well as organizational levels (for faculties, centers, and central offices), remains a primary concern.

An engagement orientation is a vital component of organizations' efforts to achieve particular outcomes. It underpins these efforts, as it creates the basis for working collectively toward the mutually supported achievement of those efforts. In other words, setting up an engagement orientation is necessary if an organization and its leaders want to pinpoint and tackle an issue, or otherwise achieve an outcome, together with all members in an authentic way. This approach involves pursuing full and meaningful involvement with all possible parties (within, but also outside of, the organization); the involvement can take a variety of forms, ranging from town hall meetings to group problem-solving sessions. Therefore, the engagement orientation involves "synthesizing meaning and value that evolves from dialogue, interaction, and connection with diverse stakeholder views and perspectives" (Johnston, 2018a, p. 4). Johnston (2018a) also notes that intention is a key component in the orientation, as the various parties need to have the intention and willingness to engage with each other and deal with the issue that needs to be addressed or pursue the identified desired outcome.

The orientation is not designed to benefit the organization alone; the intention is, instead, to help the organization "engage at the social or civic level" (Johnston, 2018a, p. 4). This aspect of the orientation reflects the recognition that organizations can (and should) contribute to the maintenance, and enhancement, of civil society and the creation of social capital (Taylor & Kent, 2014). Building this type of capital, which refers to individuals' interpersonal connections, helps to create the "norms of reciprocity and trustworthiness that arise from them" (Putnam, 2000, p. 19). For HEIs, engagement at the social and civic level often requires considerable program development, as well as the careful management of various partnerships; Hoy et al. (2012, p. 185) also point out that it often necessitates HEI members "identifying themselves as being from and part of the community, be that of place or of a chosen identity." Although such self-identification is not an issue for many students, academics, and other staff,

who feel comfortable in acknowledging their connections with particular communities, it may be an issue for others.

With its focus on both the internal members and external communities connected to an organization, the engagement orientation can go a long way toward assisting HEIs in successfully developing and implementing long-term strategic planning and financing for sustainability. This assistance is vital given the important roles that HEIs themselves play in terms of sustainability. Although all institutions need to help societies and their members meet "the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1991, p. 87), HEIs have signal contributions to make. This is because they are path-breaking leaders and role-models for other institutions, as well as key agents in the education of future leaders who will be vital to the successful implementation of the United Nations Sustainable Development Goals (SDGs). As the SDSN (2017) argues, none of the SDGs will be achieved without HEIs; these institutions support the implementation of every SDG in a variety of ways, including SDG-related learning and teaching, research supporting the implementation of the SDGs, the provision of sustainable campus services and facilities, and external leadership facilitating wider dialogue, policy-making, and action. At the same time, Žalėnienė and Pereira (2021, p. 99) have pointed out that HEIs particularly contribute to the implementation of seven SDGs: Goal One (ending poverty in all its forms everywhere), Goal Three (ensuring healthy lives and promoting well-being for all, at all ages), Goal Five (fostering gender equality), Goal Eight (ensuring decent work and economic growth), Goal Twelve (encouraging responsible consumption and production), Goal Thirteen (mitigating climate change), and Goal Sixteen (bringing about peace, justice and strong institutions). More broadly, the higher education sector is a transformational agent that has a "tremendous impact" on students' habits and contributions to more prosperous societies; this impact is demonstrated in a variety of ways, ranging from mindset changes in students to broader cultural changes brought about by alumni and their communities (Žalėnienė & Pereira, 2021, p. 99).

Despite the important roles that they play, HEIs (and particularly their leaders and staff) continue to face multiple obstacles to nurturing sustainability successfully (in both the short and long terms). The barriers include unchanging curricula, insufficient institutional support, and inadequate professional development for staff (Lozano et al., 2017; Sibbel, 2009).

More broadly, O'Brien (2016) notes that many aspects of current educational systems—from pedagogies to infrastructure—are simply not set up to nurture sustainability (or related priorities, such as sustainable wellbeing). Indeed, a UNESCO (2005, p. 59) report memorably asked: "Is education the problem or the solution in working toward a sustainable future? At current levels of unsustainable practice and over-consumption, it could be concluded that education is part of the problem." Whole educational systems (including their pedagogy and infrastructure) needed to be redesigned, the report argued, to shift societies' thinking beyond unsustainable activities. The implementation of an engagement orientation for sustainability can help institutions play their part in gradually reshaping the education system by starting to nurture change close to home and implementing localized initiatives. The orientation can aid members of HEIs—students and staff, at various levels, as well as other stakeholders—to recognize the importance of sustainability, promote mutual efforts to foster it, and implement initiatives driven by dialogue and cooperation. The following section discusses one such implementation effort and its benefits.

2 Implementing an Engagement Orientation

Macquarie University provides a rich case study of the implementation and nurturing of an engagement orientation for sustainability. Conventional qualitative content analysis reveals that the institution describes itself as having a "proud tradition of discovery", evidenced by its innovative teaching and collaborative research activities—that include, among others, pioneering open admissions procedures and medical research activities based at Australia's first fully integrated health precinct—but the university does not claim to have had a founding or historical focus on sustainability (Macquarie University, 2022a, para. 14). At the same time, the university—whose community comprises 44,000 students and 3000 staff—actively highlights its nonconformist nature; the organization states that:

> Since our foundation in 1964, we have aspired to be a different type of university: one unbound by ivory towers and sandstone walls. Rather, we are focused on fostering collaboration between students, academics, industry and society, encouraging all to traverse the boundaries of their own perspective and affect change. (Macquarie University, 2022a, para. 6)

This description highlights the fact that the university has an orientation that enables it to embrace change, including the type of change needed to foster sustainability.

The institution implemented various sustainability measures over the years, though 2008 was the year in which it developed its engagement orientation. In 2001, the university won a New South Wales state government sustainability award for the cogeneration plant that it installed the previous year (with the plant using gas to fuel two generators producing electrical energy and recovering heat both to run an absorption chiller and to supply heating to two buildings). In 2006, the organization opened a new building that incorporated mixed-mode ventilation (Denby, 2009, p. 5). However, 2008 marked the year in which the institution "began to make a strenuous professional and coordinated effort" to become "a model of sustainability" (Schwartz, 2009, p. 3). This shift took place as a result of "dialogue, interaction, and connection" among the university's members (Johnston, 2018a, p. 4). Specifically, it evolved through events, small and large, held on campus; as Schwartz (2009, p. 3) recounts:

> At Town Hall meetings, at sustainable development group meetings and in response to our Divisional consultations, the Macquarie University community has made it clear that it wants the University to become a model of sustainability. Our researchers have revealed the impacts of climate change and our economists and scientists have modelled what can be done to combat its effects. It is only fitting that the University, as an institution, works towards sustainability through all that it does, from building to teaching.

A guiding intention to implement this engagement orientation for sustainability is also evident in the comment that, at the time, "we [the university community] have come to understand that sustainability is not a program, nor even a set of priorities. Rather, it requires changes to our way of thinking, decision-making and to our actions," and that "[a]t Macquarie, we have acknowledged this and are seriously beginning to challenge our organizational patterns, attempting to work across structures and embody the principles of sustainability into all that we do" (Schwartz, 2009, p. 3).

Through the engagement orientation, the university began to foster a range of sustainability initiatives. Various actions—undertaken in specific divisions, as well as central offices—were set in motion through the orientation. In the initial stages alone, in 2008, the university hired several staff,

including a full-time Director of Sustainability, to manage the challenge. It undertook discussions with as many staff and students as it could, including its most senior leaders, in order to develop its goals and objectives. Over 100 meetings, ranging from departmental meetings to on-campus union meetings, were held in 2008. The largest of these meetings, a university "town hall" event, was attended by approximately 350 members of the university community. No less than 15 external meetings with stakeholders—including the City of Ryde (a local municipality), Sydney Water, and the Department of Environment and Climate Change—were also held that year (Denby, 2009, p. 22). These discussions revealed that key issues raised during stakeholder engagement sessions included: waste management practices being below standard, paper usage being excessive, lights being left on unnecessarily, biodiversity being lost as a result of development projects, and facilities for cyclists being inadequate (Denby, 2009, p. 23). Consequently, the university undertook water, waste, and transport audits, in addition to developing key documents—such as a sustainability policy and strategy—to guide further work. It also recruited students and staff into its Action Groups that focused on campus operations, education, development, procurement and human resources (Schwartz, 2009, p. 3). Denby's (2009, p. 4) reflection that, "[u]tili[z]ing a holistic approach, we are ensuring that our commitment to a sustainable future is evident in our activities and in our curricula. … We accept our responsibility to do this because we recogni[z]e we are a place of learning" echoes the unique role of HEIs in nurturing sustainability. In this respect, one might argue that peer-learning is another key aspect of the engagement orientation, as the members of a community learn from each other in further strengthening the orientation and encouraging further, and progressively more effective, action.

The initiatives brought to life in 2008 continue to grow through the engagement orientation. Annual sustainability reports show numerous resources and practices—too many to list individually—being implemented, ranging from campaigns (such as an initiative to encourage the use of reusable water bottles) to the creation of infrastructure (including large structures, such as environmentally friendly buildings, as well as small resources, like a permaculture garden used in teaching) (Macquarie University Sustainability, n.d.). Other major achievements include the development of a Sustainability Representative Network, comprising "Sustainability Champions" from all departments and faculties; the implementation of sustainability staff induction and on-boarding programs; the

creation of the Corporate Sustainability and Environmental Finance Research Centre, which develops market applications to solve environmental and social problems; the provision, for students, of community engagement-oriented work experience and leadership programs relating to the SDGs; the construction of an Arboretum, which contains remnant areas of endangered forests and provides a habitat for native birds; and the establishment of the Bushcare@MQ team, which comprises volunteers who work to regenerate the rare natural habitats found on the campus (Macquarie University, 2022b). Sustainability is now centrally integrated into long-term planning and strategic documents. For instance, in creating and implementing its Campus Master Plan in 2014, the organization established significant commitments to "target the reduction of energy and water use, minimi[z]e emissions, and divert waste from landfill by 2030" (Macquarie University, 2021a, para. 3). Reporting on its progress in 2021, the university noted that it had made significant advances, especially in switching to a 100% renewable electricity source for its main campus, and in reducing energy use (by 33% against a 40% target for 2023), minimizing emissions (by 32% against the same target), reducing water use (by 34% against the same target), and diverting waste from landfill (by 84% against a 90% target for 2023) (Macquarie University, 2021b). The long-term strategic plan, *Our University: A Framing of Futures*, developed to help mark the 50th anniversary of the institution, also states unequivocally that the university "will … adhere firmly to our commitment to the principles of sustainability in all we do" (Macquarie University, 2013, p. 20).

The engagement orientation also helped to bring about financial decisions designed to encourage sustainability. In particular, in 2018, the university transacted a $250 million dual-tranche sustainability bond. This first dual-tranche university bond in Australian dollars—that included the longest-dated, labeled sustainability bond—was commended by the *Environmental Finance* (2019) news outlet for enabling the university to deliver positive environmental and social outcomes. The proceeds were earmarked for green buildings, pollution prevention and control, alternative energy and energy efficiency, sustainable water and wastewater management, and the environmentally sustainable management of living natural resources and land use. According to one banker involved in the deal, the transaction was two-times over-subscribed, and demand was dominated by high-quality asset managers and life insurance funds (*Environmental Finance*, 2019). The ten-year bond highlights the way in which the engagement orientation can effectively shape not only a HEI's

strategic plans, but also its long-term financing, in continuing to adapt to (and support) the institution's needs.

3 Challenges and Limitations

Despite the successes that the previous section outlines, the engagement orientation fostered by Macquarie University also faces various challenges, beginning with organizational changes. In 2013, the institution adopted a new strategic plan (as noted, as well, in the previous section); accordingly, the Sustainability Strategy also needed to be redeveloped to align with the plan. As the conventional qualitative content analysis of the organization's collateral revealed, the existing strategy only covered the period 2009–2014; as such, it was nearing its end when the new university-wide strategic plan was adopted (Macquarie Sustainability, 2014). As a result, the sustainability department needed to expend time and energy on tasks—including fresh rounds of extensive consultations with stakeholders—that related to the redevelopment of the Strategy. Consequently, planning for individual initiatives stalled, with the department writing in its annual report that, "[u]nfortunately the accompanying action plans which detail how we will implement the strategy were not completed on time due to incomplete stakeholder input. These action plans will be completed in 2015" (Macquarie Sustainability, 2014, p. 8). As the annual sustainability reports stopped being published online in 2014 (Macquarie University Sustainability, n.d.), details about the action plans (if they were ever completed) are unavailable.

Over the years, as well, the organizational structure of the university changed, as all organizations' structures always do, in evolving to meet shifting requirements. The structural changes prove problematic for the sustainability staff and their visibility. In 2008, the sustainability department—then called Sustainability@MQ—sat directly within the portfolio of the senior executives. In 2014, under the new title of Macquarie Sustainability, the unit became an "Administrative Department," alongside other departments such as the Graduation Unit, Financial Services, and the Marketing Unit. By 2022, it disappeared from the university's structure, no longer appearing in the organizational charts (Denby, 2009; Macquarie Sustainability, 2014; Macquarie University, 2022c). Although it is not immediately identifiable in the structure—and, thus, much less approachable for staff and students—it still exists, confirmed by a careful search of the university website also revealing its new title—Sustainability

Unit. This search also yields a contact email address at the bottom of one of the webpages about sustainability (Macquarie University, 2022b).

The engagement orientation also faced external turbulence: the same turbulence that many (if not most) institutions have had to endure during the past four years. The global COVID-19 pandemic, in particular, severely impacted Macquarie University. Due to domestic and international funding shortfalls, the university took "hardline budget measures" that include a freeze on the hiring of new staff, a pause in the renewal of fixed-term contracts, and the dissolution of the Faculty of Human Sciences (Baker, 2019, para. 1), among other measures. The "locking-down" of Sydney also forced the cancellation of in-person activities, such as events, at multiple universities. Macquarie's situation during the pandemic reflected that of many other universities in New South Wales; 2020–2021 reports revealed that Macquarie had recorded a deficit of more than AUD$50 million, as had the University of Technology Sydney, while, for example, the University of New South Wales had recorded a deficit of AUD$19 million and the University of Wollongong a deficit of over AUD$40 million (Sinclair, 2021).

Additionally, the engagement orientation faced the challenge of executive creep from the university's senior leaders. This type of creep refers to an executive encroaching on a particular area of an organization or community (Buerkle et al., 2017, p. 2). In this case, executive creep takes the form of the decision-making of the university's executive management making inroads on the engagement orientation. Macquarie University records show that, despite the involvement of many and varied stakeholders in the implementation and nurturing of the engagement orientation for sustainability, the university's senior leaders engaged in key strategic decision-making without consulting stakeholders. For example, allocation reporting for the sustainability bond shows that:

> the Macquarie University Finance & Facilities Committee (F&FC), under delegation from the University Council, approved at the meeting on 27th May 2019 the nomination of the Macquarie University Central Courtyard Project to receive 100% of the proceeds totalling $250m of the Bonds raised under the Macquarie University Sustainability Financing Framework. (Macquarie University, 2019, p. 3)

This sort of decision-making goes against the ethos and practices of the engagement orientation. Top-down judgments conflict with the very idea

of organizations engaging in meaningful interactions with diverse stakeholders to undertake collective action, in authentic ways, together. Multiple other consequences can arise from these sorts of actions, ranging from a cooling of the organizational climate to outright revolt on the part of the staff. In Macquarie's case, fortunately, such unpleasant consequences seem not have eventuated.

As these challenges illustrate, the engagement orientation can entail limitations that can prevent it from continuing to flourish and guide an HEI in nurturing sustainability. I offer the following recommendations, drawing on the Macquarie University case study, to help other HEIs and their members implement an engagement orientation for sustainability of their own.

- The executive leaders of HEIs need to be committed, at the outset, to engaging meaningfully and attentively with multiple stakeholders. The leaders need to be prepared to maintain this commitment for the long term. Staff, students, and external stakeholders need to monitor the leaders' actions to ensure that commitments are, indeed, faithfully maintained, as well as take action (through tools such as petitions, public meetings, and even rallies) when they are not.
- Additionally, an HEI's leaders should avoid making unilateral decisions without wider consultation. Otherwise, as Greenwood (2007) notes, engagement can end up being reduced to an instrument for manipulation or co-optation. Leaders should bear in mind that, in an era of increasing transparency and growing online communication by "active publics" with ever-higher expectations surrounding organizational behavior (Hutchins & Tindall, 2016), unpopular unilateral decisions are likely to result in reputational damage to the leaders themselves and the institutions that they serve.
- A HEI's sustainability approaches should grow organically out of dialogue with as many members of the institution as possible. The approaches should meet the needs of that particular institution. To ensure that such dialogue takes place, gatherings (especially meetings) should be organized with a wide variety of individuals and groups; the gatherings should also be promoted as widely as possible in advance, in order to increase interest and maximize participation.
- When organizational change takes place, the sustainability team or division should be retained in close proximity to the HEI's executive

leaders, in order to show stakeholders that sustainability continues to be supported at the highest levels of the organization.
- A HEI's sustainability resources should be prominent, easily accessible—in person (especially on campus) and online—easy to understand, and well-maintained. Their development should be continuous to refine and improve the orientation long after its initial inception. Advances in theory and practice relating to sustainability broadly, and frameworks like the SDGs specifically, should be reflected in the resources.

4 Conclusion

As the need for effective action to support successful, long-term sustainability initiatives grows each year, HEIs need more useful tools at their disposal to meet the challenges associated with this need. The engagement orientation is one such tool. As this chapter argues, the orientation can significantly help HEIs foster sustainability, as it enables collective action to grow out of meaningful connection and dialogue with diverse parties; at the same time, the engagement orientation faces limitations, such as organizational changes, external turbulence, and executive creep. As the case study of Macquarie University demonstrates, the orientation, when implemented and nurtured effectively, can helpfully shape strategic decision-making and financing (not just for sustainability, but also for other HEI areas) for many years down the line. For community members, the benefits of developing bottom-up responses, instead of being given top-down directives, are significant.

This chapter opens a range of avenues for further inquiries. I examined a single case study here; future investigations could compare other cases to understand how other HEIs implement the engagement orientation, and how those institutions develop sustainability practices in response. In that respect, researchers might employ other approaches—such as interviews with HEI community members and ethnographic methods—to examine members' responses to the orientation and the implementation of the sustainability initiatives. Finally, stakeholders could undertake action research to establish and nurture engagement orientations for sustainability in other HEIs. Such research approaches will become increasingly important in the coming years to help HEIs provide leadership for a world that needs to address its sustainability shortfalls with growing urgency.

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Correction to: Sustainable Practices in Higher Education

Thomas Walker, Khaled Tarabieh, Sherif Goubran, and Gabrielle Machnik-Kekesi

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The original version of notes on contributors in this book incorrectly stated the affiliation for Author Kruti Dholakia. The correct affiliation is as below:

Kruti Dholakia holds Master's in Textiles and Clothing from S. P. University, Vallabh Vidhya Nagar.

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