Education for Sustainable Development

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Definition

The word sustainable derives from the Latin *sustinere*, which means "to hold up, hold upright", or "furnish with means of support" (Stevenson 2010, 4612). The uses and meaning of the word have evolved gradually to include the provision of the necessities of life. This contemporary usage can be understood in two ways: as a broad concept relating to ecosystems, but also in a narrow sense relating to human well-being (Harrington 2016). In universities, sustainability encompasses a wide range of activities and is commonly identified using the term *education for sustainable development* or ESD, defined as "holistic and transformational education which addresses learning content and outcomes, pedagogy, and the learning environment" (UNESCO 2020, 8). Engagement with sustainability and sustainable development in higher education continue to expand in scope since the publication of a comprehensive review in 2016 (Barth et al. 2016). Recent developments have highlighted the significance of transdisciplinary approaches to producing and circulating knowledge, as well as transforming higher education for global sustainability (Parr et al. 2022).

However, each of the ESD words is contested, and there are multiple interpretations in higher education. A sense of the definitional challenges is highlighted in the first volume of the *International Journal of Sustainability in Higher Education* (Leal Filho 2000). The different meanings of the word sustainability in different languages are illustrated, encompassing, for example, the long-term use of resources; how social and economic development takes place; the ethics of development; and the environmental impact of development. Combining sustainability with the different perspectives of the global north and south, post-colonial societies, and post-conflict settings generates additional complexity (Janssens et al. 2022).

How does one make sense of this kaleidoscope of ideas? Three key points can be made. Firstly, how do we define sustainable development? A seminal United Nations publication, *Our Common Future* (also called the Brundtland Report), describes sustainable development as "meet[ing] the needs of the present without

compromising the ability of future generations to meet their own needs" (Brundt-land 1987, 43). The broad scope of this definition has been questioned and multiple alternative definitions proposed, but the sentiment expressed is enduring: the idea that sustainability encompasses the intergenerational needs of humanity. Nevertheless, the redefinition of sustainable development is ongoing, with, for example, the introduction of new perspectives such as sustainable entrepreneurship within planetary boundaries (Hummels and Argyrou 2021).

Secondly, how do we engage with the idea of sustainable development? UNESCO, the United Nations agency tasked with education relating to sustainable development, emphasizes the nature of ESD as: "a lifelong learning process and an integral part of quality education that enhances cognitive, social and emotional and behavioural dimensions of learning" (UNESCO 2020, 8). However, at least two approaches along a gradient of types of engagement have been recognized in educational settings. A narrow approach conceives of ESD as an addition to, or extension of, conventional courses and taught within established academic disciplines. This contrasts with a broad approach to ESD that is holistic and privileges education reform and transformation (Sterling 2021).

Thirdly, how do we practice sustainable development? A considerable effort has been made over the last 20 years to identify the knowledge, skills, and attitudes (i.e. competencies) that are relevant outcomes for higher education learners. Different frameworks and models have been used, of which the most influential is that proposed by Wiek et al. (2011). This framework is the most accepted among experts in the field and informs the learning objectives for achieving the United Nations Sustainable Development Goals (Redman et al. 2021).

In summary, the multiple definitions, approaches, and frameworks associated with ESD have highlighted the limitations of partial and discipline-based approaches to sustainability. To overcome these limitations, it is argued that transdisciplinarity must become the lens through which the relevance of all disciplinary research and teaching relating to sustainability needs to be understood.

Background

Since the early 1960s the emergence of debate, research, and actions relating to sustainable development can be tracked though a series of historical events triggered by increasing concerns about how human actions impact the environment. Table 1 identifies and includes highlights relating to some of the more influential ESD-related events which predate the introduction of the UN's Sustainable Development Goals in 2015.

The historical development of education for sustainable development outlined in Table 1 has influenced, and is influenced by, transdisciplinary thinking. The

seminal work of Erich Jantsch (1970) viewed education as evolving from "training for well-defined, single-track careers and professions [...] towards an education which enables judgement of complex and dynamically changing situations" (Jantsch 1970, 407). Underpinning this evolution was the increasing adoption by universities of transdisciplinary approaches to teaching and research as a means of increasing the capability for innovation. More recently, Scholz (2020) has highlighted the significance of transdisciplinary approaches for transitioning to sustainable development and reiterated the role of universities for the public good. The 50-year period separating the work of Jantsch and Scholz has witnessed a wealth of research and practice reported in dedicated academic journals and handbooks. In addition, interest in the approach is reflected in the emergence of global communities of practice, such as the Network for Transdisciplinary Research (td-net) and the International Center for Transdisciplinary Research (CIRET).

Table 1. History of education for sustainable development
(adapted from UNESCO 2020, 65)

Year	Event or publication	UNESCO ESD highlights
1972	United Nations Conference on the Human Environment, Stockholm.	The need for education in environmental matters.
1987	Our Common Future (Brundtland Report).	Sustainable development defined.
1992	The United Nations Conference on Environment and Development (Rio Summit), Rio de Janeiro.	Education is critical for promoting sustainable development.
2002	World Summit on Sustainable Development (Johannesburg Summit), Johannesburg.	Designated 2005–2014 as the United Nations Decade of Education for Sustainable Development.
2005	UN Decade of Education for Sustainable Development (2005–2014).	Reorientation of education globally towards a central goal: to learn to live and work sustainably.
2009	UNESCO World Conference on ESD, Bonn.	Emphasized ESD as a "life-saving measure" for promoting ESD as "an investment in the future".
2012	The United Nations Conference on Sustainable Development (Rio +20), Rio de Janeiro.	The need to integrate sustainable development more actively into education.
2014	UNESCO World Conference on ESD, Aichi-Nagoya.	Launched the Global Action Programme: scaling up action in education to accelerate progress towards sustainable development.

What can be synthesized from the coevolution of sustainability and transdisciplinarity of relevance to education? Arguably, the most profound concept is that of mutually dependent knowledge. This idea is underpinned by a typology consisting of systems, target, and transformation knowledge, which together give meaning to a particular interpretation of a problem area (Brennan and Rondón-Sulbarán 2019; Pohl and Hirsch Hadorn 2007). Systems knowledge relates to a current situation and questions about the interpretations, origins, interactions, and trends relating to a problem. Target knowledge looks to desired future states and questions relating to better ways of operating and behaving. Transformation knowledge examines the means of changing from a current situation to a desired future state. The dynamic relationship between the three types of knowledge is important and mutually dependent. In other words, the knowledge about, and assumptions relating to, a particular challenge in sustainable development are provisional and not absolute. This interdependence creates a particular way of knowing about a challenge: such knowledge is conditional and interpretative (Popper 1959, 79).

The contingent character of knowledge, implicit in sustainable development research, has resulted in an emphasis on key ESD competencies and specific learning outcomes. The reason for this focus is partly due to the continually evolving interpretation of sustainable development, as well as the need to span the different "worlds" of the physical environment, societies, and economies – for example, de Haan's articulation of the concept of *Gestaltungskompetenz* ("shaping competence") relating to the capacity to act and solve problems in a particular setting (de Haan 2010, 318). In addition, several frameworks have been developed with attendant lists of different types of competencies, though this approach has been criticized repeatedly for the "laundry list" manner of articulating such competencies (Brundiers et al. 2021). Wiek's introduction of a model-based framework (Wiek et al. 2011) resulted from a reported convergence in the education literature around a set of key competencies in sustainability: systems thinking; futures or anticipatory thinking; values or normative thinking; strategic and action-oriented thinking; and collaboration or interpersonal approaches. These were subsequently broadly adopted, with additions, by UNESCO in the identification of the learning objectives for achieving the United Nations Sustainable Development Goals or SDGs (UNESCO 2017).

Debate and criticism

The Sustainable Development Goals act as a framework that identifies 17 end-states that are important for human survival on earth. Education relates to all 17 areas and in addition has a dedicated focus within SDG4: Quality Education. SDG4 encompasses a series of targets with associated indicators that explain what is involved in the each. Table 2 highlights key ESD-related events and publications linked to the SDGs.

Table 2. Education for sustainable development and the Sustainable Development Goals

Year	Event or publication	UNESCO ESD highlights
2015	UN introduction of the SDGs and the 2030 Agenda for global transformation.	Global Action Programme on ESD (2015–2019) aimed at promoting concrete actions in ESD.
2017	UNESCO ESD goals: learning objectives identified.	"ESD requires is a shift from teaching to learning … inter- and transdisciplinarity … linking of formal and informal learning" (UNESCO 2017, 2).
2018	UNESCO highlights issues and trends in education for sustainable development.	"ESD entails rethinking the learning environment, physical and virtual" (UNESCO 2018, 8).
2019	40th Session of the UNESCO General Conference.	Adoption of a framework for the implementation of ESD beyond 2019 (2020–2030).
2020	Education for Sustainable Development Goals: A Roadmap.	"Often ESD is interpreted with narrow focus on topical issues rather than with a holistic approach" (UNESCO 2020, 9).
2022	Berlin Declaration on Education for Sustainable Development.	"ESD must be based on … respect for nature, as well as human rights, democracy, the rule of law, non-discrimination, equity and gender equality" (UNESCO 2022, 3).
2022	Knowledge-driven action: transforming higher education for global sustainability.	The imperative need for institutions to become open, fostering epistemic dialogue and integrating other ways of knowing (Parr et al. 2022, 14).

The emerging discourse summarized in Table 2 emphasizes the need for transdisciplinarity to tackle the complexity of sustainability challenges. This need is based on a recognition that individual scientific disciplines can only ever provide partial solutions: challenges can be perceived and interpreted in different ways. This takes place through knowledge integration and a recognition of differing societal and scientific discourses (Jahn et al. 2012). Increasingly, the evolution of ESD approaches is being viewed as a series of phases. An initial orientation phase (1970–1990), with a focus on environmental issues; a secondary transition phase (1990–2000), with the broadening of the debate to include development themes; and finally, the current expansionary phase (2015 onwards), with a focus on sustainability as a key agent of change (Michelsen et al. 2016). However, debate and criticism highlight a concern that the ESD concept is more often described than defined. This is unsurprising, as "no one discipline can claim education for sustainable development" (UNESCO 2005, 31). ESD is typically explained in terms of frameworks of competencies, despite no explicit consensus on a specific frame-

work (Brundiers et al. 2021). More critical debate suggests that international efforts to promote ESD have been hampered by lack of clarity on how to implement this form of education (Vare et al. 2019). Further, there is a need to include other, non-European, ways of knowing, including indigenous perspectives (Rondón-Sulbarán et al. 2021) and experts from Latin America, Middle Eastern, and African higher education with alternative perceptions on development.

Current forms of implementation in higher education

The aspiration is for education for sustainable development in higher education research and teaching to become transdisciplinary in perspective and transformational in practice (Parr et al. 2022). This transformational aspect of education encompasses learning content and outcomes, pedagogy, and the learning environment itself. How this takes place in practice is conditioned, arguably, by the contrasting narrow and broad approaches to education for sustainable development. A narrow approach deconstructs ESD into component parts (students, faculty staff, and institutions) and then looks at novel ways in which learning and teaching engage with sustainable development. In this way discipline-based curricula are modified and redesigned to reflect the sustainability agenda. Faculty staff are encouraged to collaborate with colleagues from different disciplines, and institutions register and promote such initiatives as examples of ESD with relevance to regional or national economies. This approach arguably fails to understand the inherent complexity of sustainability challenges and at worst can be viewed as an optional addition to education practices.

An alternative, broad approach to education for sustainable development recognizes the complexity of sustainable development and the dynamic nature of human actors, social groups, and institutions involved in education. A useful way of understanding the implications of this approach is to view education as an innovation system (Jantsch 1970), consisting of a nested hierarchy of analytic dimensions (Geels 2004). This approach privileges different forms of innovation activities at different levels. A micro-level involves novel configurations or niches that are shaped by an existing education regime in a particular local or regional setting – for example, Utrecht University in the Netherlands with its emphasis on transformative hubs in Future Food; Negative Emissions; Transforming Cities; Water, Climate, and Future Deltas; and Circular Economy and Society (Parr et al. 2022, 40). A second, meso-level is envisioned as patchworks of regimes encompassing sociocultural elements; market networks; policy; science; and technology. These regimes constantly evolve and interact with micro-level learning and teaching innovations. For example, the Quality Assurance Agency for Higher Education in the United Kingdom has produced a guide (QAA/Advance HE 2021) that promotes practical actions for higher education

across British universities. The opportunity for ESD to reinforce individual institutional objectives is explicit and includes the promotion of transdisciplinary learning, employability, enterprise, entrepreneurship, and civic engagement. Key competencies are linked to an overarching model of learning which is identified as central to the transformational learning experience. A third, macro-level is conceived as an evolving sociotechnical landscape that is transformed by a patchwork of meso-regimes. The dynamic nature of this evolving macro-landscape creates emerging opportunities. For example, GreenComp, the European competence framework (Bianchi et al. 2022) is an organizing framework consisting of: developing sustainability values, embracing complexity, envisioning sustainable futures, and acting for sustainability. The benefit of such a micro-, meso-, and macro-innovation systems approach is that it provides a more contextualized and dynamic understanding of the increasing numbers of case study examples of ESD in different contexts across the globe, as illustrated in Table 3.

Table 3. Learning and teaching education for sustainable development

Source	University	Education for sustainable development as …
Baumber 2022	University of Technology Sydney, Australia	A transdisciplinary approach to facilitate transformative learning through a focus on real-world challenges.
Taylor et al. 2021	Tampere University, Finland	Skills and competencies required and effective pedagogic practices that could help educate future professionals.
Cavalcanti-Bandos et al. 2021	Higher education institutions in Peru, Brazil, and Colombia	Critical thinking surrounding rational bases for exploring the environment. Organizational development, supporting culture, and planning for sustainability integration.
Galvão et al. 2020	University of Lisbon, Portugal	Student learning as collaborative experience towards transdisciplinary knowledge creation.
Jia et al. 2019	Tongji University, China	Comprehensive transformation of curricula and pedagogy to bring coordinated innovation at multiple levels.
Awuzie and Emuze 2017	Central University of Technology, South Africa	Implementation drivers such as cost-related, regulations, competitive advantage, and community engagement.

In summary, the idea of education for sustainable development is continually evolving but broadly speaking can be understood in three ways: (1) Education *about* sustainable development with an emphasis on raising awareness. (2) Education *for* sustainable development as a way of widening perspectives with a view to influencing practice. (3) Education *as* sustainable development involving behavioral and paradigm change.

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