

Online learning and teaching for the SDGs – exploring emerging university strategies

Emerging
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strategies

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Abstract

Purpose – The purpose of this paper is to explore emerging synergies and tensions between the twin moves to the United Nations Sustainable Development Goals (UN SDGs) and online learning and teaching (L&T) in higher education institutions (HEIs).

Design/methodology/approach – A preliminary global exploration of universities' SDG-based L&T initiatives was undertaken, using publicly available grey and academic literature. Across a total sample of 179 HEIs – identified through global university rankings and analysis of all 42 Australian universities – 150 SDG-based L&T initiatives were identified. These were analysed to identify common approaches to embedding the SDGs.

Findings – Five key approaches to embedding the SDGs into online (and offline) HEI L&T were identified: designing curricula and pedagogy to address the SDGs; orienting the student experience towards the SDGs; aligning graduate outcomes with the SDGs; institutional leadership and capability building; and participating in cross-institutional networks and initiatives. Four preliminary conclusions were drawn from subsequent analysis of these themes and their relevance to online education. Firstly, approaches to SDG L&T varied in degree of alignment between theory and practice. Secondly, many initiatives observed already involve some component of online L&T. Thirdly, questions of equity need to be carefully built into the design of online SDG education. And fourthly, more work needs to be done to ensure that both online and offline L&T are delivering the transformational changes required for and by the SDGs.

Research limitations/implications – The research was limited by the availability of information on university websites accessible through a desk-top review in 2019; limited HEI representation; and the scope of the 2019 THE Impact Rankings.

Originality/value – To date, there are no other published reviews, of this scale, of SDG L&T initiatives in universities nor analysis of the intersection between these initiatives and the move to online L&T.

Keywords Online education, SDGs, Learning and teaching, Curriculum transformation, Higher education institutions

Paper type General review

Introduction

The United Nations (UN) has identified higher education institutions (HEIs) as key to implementing the 2030 Agenda for Sustainable Development, at the heart of which lie the 17 Sustainable Development Goals (SDGs). SDG 4 (“Quality education”) aims to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all” [1]. Targets and indicators within SDG 4 focus on equal access and opportunity for all



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(Target 4.3 and 4.5), developing skills and capabilities (Target 4.4) and imparting specific knowledge on sustainable development (Target 4.7).

University learning and teaching (L&T) contributes to far more than just SDG 4. It is a crucial enabler of the 2030 agenda's overall success. As the UN underlines, the SDG agenda is about *transformative* change; radical and simultaneous improvements in social justice, equality and environmental sustainability. This poses far-reaching ramifications for all institutions and organisations and requires people who are knowledgeable and skilled in the relevant topics, motivated to help achieve change and aware of the intersecting systemic challenges. There is an urgent need for new knowledge, skills and understandings of the sort HEIs can, in theory, help provide.

Yet the transformative change demanded by the SDG agenda is both a challenge and opportunity for universities. Many are not currently set up to contribute substantially to the SDG agenda, and indeed many aspects of universities further exacerbate problems of injustice and environmental degradation that the 2030 Agenda is trying to redress (Rickards and Steele, 2019). New approaches to education are needed at multiple levels if L&T is to be *for* as well as *on* the SDGs.

At the same time, universities are being forced to negotiate the accelerating shift to online (i.e. internet-based and computer mediated) learning, especially in the wake of the COVID-19 pandemic and its likely long-term impacts on higher education (HE). Although distance learning is explicitly recognised as important to SDG 4 as a means of increasing educational access, no publicly available research to date explores the implications of these intersecting turns in university L&T: to SDGs on the one hand and to online education on the other. In this paper, we take up this challenge by looking not only at the academic literature but also at what universities are starting to do in practice.

We begin by briefly reviewing the literature on the implications of the SDGs for university L&T. Mostly normative and conceptual, this literature is strongly related to the longer-standing scholarship on Education for Sustainable Development (ESD) and Education for Sustainability (Efs), in keeping with the call for "ESD" under SDG 4. While there is virtually no literature about online SDG L&T *per se*, we include a brief overview of ESD and Efs literature about online education to point to some of the inherent challenges and opportunities. We then present the results of a high-level exploration of 150 initiatives from universities around the world related to SDG L&T. We highlight the abundance of work being undertaken and its similarities and differences to what is being discussed in the academic literature. To end, we point to the need for more critical engagement with the online turn to SDG L&T and the opportunity for important new research in this key area.

Review of SDG L&T literature

Engagement with the SDGs in academic L&T literature reflects dominant themes in ESD scholarship, notably curricula, pedagogy, student experience, competencies and attributes.

A strong theme in literature on reorienting university L&T towards the SDGs is the need to embed the goals throughout different areas of university curriculum (Brugmann *et al.*, 2019). Some authors call for core and compulsory subjects on the SDGs (Mawonde and Togo, 2019), and others continue ESD's general advocacy for interdisciplinary and transdisciplinary teaching (Agbedahin, 2019; Sonetti *et al.*, 2019). Reflecting the real world issues the SDGs have been prompted by, pedagogical approaches advocated in SDG L&T literature are generally problem-based, critical, student-cantered and experiential (Agbedahin, 2019; Barth and Burandt, 2013; Brugmann *et al.*, 2019; Zamora-Polo and Sanchez-Martin, 2019; Melles and Paixao-Barradas, 2019).

In keeping with the wider ESD literature, scholarship on SDG L&T also draws attention to the wider institutional environment in shaping students' learning outcomes. [Buil-Fabrega et al. \(2019\)](#) point out that universities can work to embed the SDGs in L&T practices through a range of formal and informal student experiences, both within and beyond the classroom. "Student experience" encompasses both teacher and student-led initiatives that engage students on the topic of the SDGs as a whole, or with a particular SDG through co-curricular activities ([Brugmann et al., 2019](#)). Some scholars warn that elements of the student experience are unintentional and unhelpful. [Killian et al. \(2019\)](#) highlight often neglected effects of the "hidden curriculum" (informal and generally unintentional learnings) on student engagement with the SDGs.

The SDG L&T literature strongly reflects earlier ESD interest in the competencies and general attributes students develop ([Bart et al., 2016](#)). SDG target 4.7 recognises the need to cultivate particular skills, attributes and values to help achieve sustainable transformations ([Demssie et al., 2019](#)). Scholars point to the need to produce graduates who are oriented towards the ethos of the SDGs and equipped to respond to the challenges they pose ([Buil-Fabrega et al., 2019](#); [Cottafava et al., 2019](#)). Some link the real world character of SDGs to the broader concern with graduates' "employability" and argue that HEIs should: form strong links with industry; monitor employer trends and skills requirements; support students to find relevant local or international work opportunities; use Project-oriented Learning (POL) approaches; and enhance lifelong learning offerings, such as executive education, online courses and vocational training ([Albareda-Tiana et al., 2018](#); [Maruna, 2019](#); [Kestin et al., 2017](#)).

The key "competencies" specifically identified in the literature for SDG education reflect those identified previously for ESD. [Dlouhá et al. \(2019\)](#), [Moon et al. \(2018\)](#) and [Riechmann et al. \(2017\)](#) contend that the vital SDG competencies are skills in systems thinking, values thinking, action learning, interpersonal skills, strategic management and integrated problem-solving. In addition, [Moon et al. \(2018\)](#) emphasise the importance of a balance between specific technical or academic competencies and "transversal" competencies; skills that are transferable between professions, able to accommodate changes in job markets and often referred to as "soft skills". In keeping with this, [Straková and Cimermanová, \(2018\)](#) highlight the need for self-awareness and "anticipatory competency" – the ability to imagine different futures. Notably, [Vilalta et al. \(2018\)](#) argue that *digital* competency is important for SDG-capable students.

The broader concept of "desired graduate attributes" is also being harnessed for SDG L&T. [Desha et al. \(2019\)](#) call for graduate attributes to be adjusted to build student capacity around the SDGs. [Killian et al. \(2019\)](#) argue that graduate attributes can help align learning outcomes with the SDGs, ethics and responsibility. [Marjoram \(2018\)](#) argues that there is an "urgent need" to develop the necessary graduate attributes in engineering students to enable them to contribute positively to the SDGs. Whether in terms of competencies or graduate attributes, authors highlight the value of reflective learning ([Boluk et al., 2019](#); [Zamora-Polo et al., 2019](#); [Riechmann et al., 2017](#); [MacFarlane, 2019](#)).

SDG L&T requires institution-wide capabilities ([Agbedahin, 2019](#); [Cicmil et al., 2017](#); [Maruna, 2019](#); [MacFarlane, 2019](#)). This can involve restructuring of university governance and organisational structures or developing new university-wide SDG centres, initiatives, resources and strategies, as well as cultivating organisational cultures that enable bottom-up leadership by teachers and students ([Zamora-Polo and Sanchez-Martin, 2019](#); [Cicmil et al., 2017](#)). Provision of appropriate support, professional development and other opportunities for staff are also recognised as important ([Leal Filho et al., 2019](#)). Teachers' alliances and associations, collaborative networks and opportunities for staff and students to connect across faculties and institutions have been suggested as means of boosting

engagement in SDG L&T practices (Cotterell *et al.*, 2019; Zamora-Polo and Sanchez-Martin, 2019).

SDGs in the context of online L&T

In exploring how the SDGs are discussed in the academic literature on L&T, we are specifically interested in how this intersects with scholarship about “online” education, given the contemporary collision between these two “turns” in HE (one towards the SDGs and the other towards online learning environments).

“Online” learning is a term encompassing a range of possible L&T approaches including fully online delivery modes, through a range of technologies or a “blended delivery” approach in which there are elements of online and face-to-face delivery (Ahel and Lingenau, 2020). One well-known example of the latter is the “flipped-classroom methodology” where students learn content in their own time (e.g. via online lectures) and come together for discussion (Buil-Fabrega *et al.*, 2019). The temporal nature of the online interaction within these approaches is also important as there can be both synchronous and asynchronous technologies and techniques, with the latter allowing students more flexibility in when they access teaching.

Inherent limitations of the shift to online learning include the digital divide between students (i.e. the reality that not all students can access and use affordable internet and related technologies, or access them at the same time) – something the SDGs themselves seek to address. Another potential constraint is that institutions often treat online learning as “a “second best” option, relevant only when “real” (face-to-face) encounters are not possible or practical” (Ross *et al.*, 2019, p. 22), as the COVID-19 pandemic has exemplified. Online education can also be viewed by students and staff as an inferior product, as there are many aspects of the “university experience” (both related to and beyond L&T) that online environments cannot fully replicate or replace, such as social events, on/off campus student residences and networking opportunities.

Ahel and Lingenau (2020) suggest that digital platforms can support the integration of SDGs into curricula in “effective, efficient, innovative and future-oriented way[s]” (p.347). They are exceptional, however, in discussing the implications of online education for L&T on and for the SDGs, and we did not find any other papers on the topic. Nevertheless, some scholars working at the intersection of online learning and ESD and EfS have been exploring whether and how the competencies, skills, literacy, capabilities and attributes needed for transformative ESD can be achieved, and even promoted, through digital spaces rather than the traditional modes of face-to-face and shared experiential learning (Bell *et al.*, 2017). Barth and Burandt (2013) suggest that to build desired competencies, online learning approaches can fulfil core principles of ESD, including:

- self-directed, active learning;
- collaborative learning to foster empathy and shared experience; and
- problem-oriented learning based on real-world examples and problems.

Ross *et al.* (2019, p. 22) argue that when online education is designed to replicate offline practices, it is inevitably found lacking, but when its different affordances are celebrated, its value becomes evident. This perspective could be directly linked to SDG L&T to support improved online pedagogy and curriculum design. Overall, however, there is a gap in the literature about the relationship between online L&T that is *on* and *for* the SDGs. In particular, it is not known how emerging L&T SDG initiatives use online teaching and to what effect.

Methodology

This paper reports on explorative research into emerging university strategies for embedding SDGs into online L&T. It takes an inductive approach (Stebbins, 2001; Strauss and Corbin, 1998) which is suited to gathering preliminary information about a little-known field or phenomenon (Stebbins, 2001), in this instance: the co-emergence of online L&T and the SDGs. An alternative research approach aiming to confirm generalisations would be premature given the infancy of HEI L&T on this topic.

For this exploratory study we used the Times Higher Education (THE) inaugural Impact Rankings (2019)[2] as a starting point to identify emerging HEI SDG L&T initiatives. Subsequent data collection occurred via internet-based searches that targeted the top five universities from the four predominant global university ranking indices (THE, QS, Reuters and Shanghai) and all 42 public and private Australian universities (given the geographic location and context of the research). Only initiatives explicitly referencing SDGs were included in the study.

In line with explorative research methods, the focus was on unveiling preliminary or emergent trends and insights, rather than generalising about SDG L&T initiatives at HEIs (Stebbins, 2001). Secondary desktop data was sourced from academic and grey literature, including (but not limited to) publicly available university webpages, online news articles, course guides, annual reports, sustainability policies and strategies and syllabi for Massive Open Online Courses (MOOCs). Sources of data were saved in a shared cloud-based folder and initiatives from each source were recorded in a master spread sheet in preparation for coding.

Following data collection, initiatives observed were thematically coded based on emergent generalisations (Stebbins, 2001), including the apparent mode of delivery for each initiative (e.g. online, face-to-face or blended). This resulted in preliminary observations about the pedagogical use and style of different modes for L&T *on* and *for* the SDGs outlined in the sections below.

Key findings

Across the total sample of 179 HEIs, we found 150 SDG-based L&T initiatives from 110 universities. A large majority of these initiatives were based at HEIs in Europe, North America and Oceania (Australia and New Zealand), while less than one quarter were at HEIs in Africa, Asia and Latin America (South America and Central America), and a small handful of initiatives were considered global. While Oceania had a large proportion of initiatives considering the region's small population, this overrepresentation was owing to our localised focus on Australian universities.

From this data, thematic analysis identified five key approaches to embedding the SDGs into online (and offline) HEI L&T:

- (1) designing curricula and pedagogy to address the SDGs;
- (2) orienting the student experience towards the SDGs;
- (3) aligning graduate outcomes with the SDGs; and
- (4) institutional leadership and capability building; and
- (5) participating in cross-institutional networks and initiatives.

In the following sections, we unpack these five approaches and discuss their alignment with the academic literature, before turning to the question of how they fit with the concurrent turn to online education. Some examples of SDG L&T initiatives at HEIs are presented in

Table 1.
Examples of
university
approaches to SDG
L&T

Approach	Initiative	Institution	Delivery mode	Description
1. Designing curricula and pedagogy to address the SDGs	Student-led curriculum audit	University of Winchester, UK	Blended	Student interns conducted a curriculum-wide assessment of SDG content to evaluate the institution's progress on the goals
	Student-led SDG data reporting project	University of Michigan, USA	Blended	Students developed metrics and comparatively reported progress on the SDGs
	Sustainability Course Inventory	University of Toronto, Canada	Online	Maps all undergraduate courses against the SDGs, to increase visibility and student engagement
	Executive Course in SDGs	Universiti Sains Malaysia, Malaysia	Face-to-face	Two-day professional development course for managers to develop their skills and experience around the SDGs
	Master of SDGs	Massey University, New Zealand	Blended	SDG-focused program, providing unique Pacific and Indigenous perspectives on the application of the SDGs
2. Orienting the student experience towards the SDGs	"The SDGs – A global, transdisciplinary vision for the future" MOOC	The University of Copenhagen, Denmark	Online	Introduces the SDGs and looks at different themes such as actors, measurement and implementation
	Global Goals Teach-In	National Union of Students, UK	Blended	Called for all UK educators to include the SDGs in courses, assessments and classrooms for one week in February 2020
	SDG Challenge University	University of Amsterdam, Netherlands	Blended	Platform for students to critically engage with the SDGs through a cross-university challenge in partnership with local industry
	Take One Step	Monash University, Australia	Online	Online digital platform to educate and engage students on the SDGs
	Aalto SDG App	Aalto University, Finland	Online	Mobile application to inspire students and staff to make choices and take action aligned with the SDGs
	SDG International e-Tournament	Hong Kong Baptist University	Online	Virtual tournament held in January 2020 with 416 students from 42 countries
	SDG Youth Training	University of Ottawa and York University, Canada	Face-to-face	Whole country initiative to educate and train young Canadians in the SDGs

(continued)

Approach	Initiative	Institution	Delivery mode	Description
	Global Citizens Project	University of Southern Florida (Tampa), USA	Blended	Program of varied curricular and extracurricular activities to engage students on the SDGs
3. Aligning graduate outcomes with the SDGs	Student Pathways Program	University of Edinburgh, UK	Face-to-face	Promotes active student-led learning across the university beyond students' main programmes of study to develop graduate attributes. The 2019–20 program focused on the SDGs
	Curriculum 2021	The University of Liverpool, UK	Blended	Framework for reviewing and re-developing core curriculum in line with the SDGs to cultivate chosen graduate attributes, including global citizenship
4. Institutional leadership and capability building	RMIT SDG Pledge and university-wide SDGs Project	RMIT University, Australia	Blended	High-level, public university commitment to promote and contribute to the SDGs, including through L&T. Enabled by a Sustainable Development Officer, website and resources
	Monash Sustainable Development Institute FutureProof	Monash University, Australia	Blended	Large institute set up to work on the SDGs through research, teaching and outreach
	DAAD-Kyoto University Partnership Programme	University of Kent, U.K.	Blended	Works with staff and students to integrate the SDGs across and within departments into their objectives, goals and tailored solutions
	Lund 2030 Graduate School	Kyoto University and German research institutions, Japan and Germany	Face-to-face	Funding for junior scholars and early career researchers to build international partnerships and collaboration on the SDGs
	College X	Lund University, Sweden	Face-to-face	Cross-faculty SDG-focused and designed PhD program that fosters interdisciplinary research studies
		National Cheng Kung University, Taiwan	Online	Online platform for transdisciplinary education, research, and outreach, through which university faculties and students can collaborate to define, develop and deliver SDG solutions

(continued)

Table 1.

Approach	Initiative	Institution	Delivery mode	Description
5. Participating in cross-institutional networks and initiatives	SDGs Report	The University of Manchester, U.K.	Online	Details the university's contribution to the SDGs in four areas, including student learning
	Environmental Sustainability Plan 2019–2025	The University of Newcastle, Australia	Blended	Guided by the SDGs and provides a roadmap for contributing to their implementation, through the university's operations, research and teaching
	SDG Academy	Sustainable Development Solutions Network (SDSN)	Online	Online education platform that offers 32s MOOCs, contributes to university courses and offers a library of resources
	SDG Accord	110 institutions, 103 support organisations and 817 individuals across 85 countries	Online	Public declaration of an institution's commitment to work towards helping achieve the SDGs and report on progress
	UN Higher Education Sustainability Initiative (HESI)	More than 300 institutional members	Blended	Encourages higher education institutions to commit to and share insights about specific SDG initiatives, advocates for higher education in UN forums, and holds various events
	The Global Alliance of Tertiary Education and student Sustainability Networks	An alliance of dozens of higher education networks, university signatories and UN bodies including HESI	Blended	Advocates to global groups and national governments on behalf of members about the importance of higher education in achieving the SDGs and reports on collective higher education progress on the SDG Accord
	Association of Commonwealth Universities SDG Network	Association of Commonwealth Universities (more than 500 members, across 50 countries)	Blended	Facilitated network to share information and ideas and to collaborate on SDG university work, including L&T

Table 1. These examples are provided to inform the reader and do not represent the full data set, but rather an “illustrative sample”.

Approach 1: designing curricula and pedagogy to address the SDGs

In keeping with discussions about the SDGs in the academic literature, many university SDG L&T initiatives are focussed on curricula. Commonly, universities begin by “mapping” what they are already doing to identify gaps and opportunities to embed the SDGs further. This can be an engagement activity in its own right, with some universities engaging staff and students in the process, thereby helping to develop their understanding of the complexities of the topic in the process and demonstrating a student-centred, problem-based pedagogy. Some mapping initiatives look comprehensively at all areas of a university’s operations, while others are focussed only on L&T (or another discrete area). Some institutions publish the results of their mapping exercise online to further aid student and staff engagement.

Compared to mapping existing curricula, fewer universities discuss pedagogical questions or have yet developed new SDG-related offerings, pointing to the early stage of SDG engagement in the HE sector and less interest in pedagogy in practice than in theory. Those new offerings that *are* evident suggest that there are two main curricula approaches:

- (1) mainstreaming SDG content across all programmes or courses of a HEI; and/or
- (2) more frequently, creating SDG-specific teaching, such as an individual subject.

Single subjects on the SDGs include: core units in sustainability-oriented programmes; interdisciplinary subjects available to all undergraduate or graduate students; summer school electives; and MOOCs.

Approach 2: orienting the student experience towards the SDGs

Some universities are attending to the importance of the wider student experience in shaping their awareness and understanding of the SDGs. In keeping with the literature, various universities are working to engage students in a range of relatively informal SDG learning experiences such as:

- SDG-focussed co-curricular or extra-curricular activities including study tours, hackathons, conferences, youth training and leadership programs;
- new or existing SDG-related student clubs and societies; and
- volunteer, internship or work experience opportunities that address the SDGs.

Other examples include digital platforms for students to engage in SDG actions and gamification or rewards-based programs. Notably, some of these include not only enrolled students but also seek to engage other young people, contributing to a university’s broader outreach agenda. Some universities are encouraging their students to engage with external initiatives such as the *Sustainability and SDG Literacy Test* by Sulitest and the *Sustainability Competencies Tool* by the Competencies for a Sustainable Socio-Economic Development (CASE) project in the European Union (EU).

Approach 3: aligning graduate outcomes with the SDGs

Employment needs or graduate attributes are valued in the ESD literature as a means of fostering meta characteristics such as global citizenship, integrating and interpreting disparate parts of a students’ education and helping them begin to apply their learning in

the real world. Often framed in terms of competencies, these “end of pipe” outcomes reflect a strong focus in the academic literature on shaping graduate outcomes around the SDGs, reflecting in turn a long-standing concern with graduate outcomes in the ESD field. However, it seems that few universities are (yet) tapping into existing research on graduate outcomes to try to embed the SDGs in students’ education. Examples are offered in [Table 1](#), illustrating how the use of SDG-related graduate attributes can add coherence to curriculum-based and/or student experience-based approaches.

Approach 4: institutional leadership and capability building

Parallel to the use of the SDGs in graduate attributes, “top down” measures like institutional leadership and development programs use the SDGs as an integrative and sense-making framework, positioning L&T as one part of the wider university. Universities’ leadership efforts to build staff and student capability and enthusiasm for engaging the SDGs in L&T generally include mixes of:

- governance and policies (e.g. development of SDG-centred plans or strategies);
- resourcing and incentives for staff and students, including PhD students (e.g. new SDG funding opportunities and library resources); and
- structural changes (e.g. inception of new SDG-based departments, schools or research centres).

To embed the SDGs into L&T, universities need to foster institution-wide interest and capabilities. This requires leadership, capability building and sometimes structural change – a relatively minor theme in the academic literature but an approach evident across many universities, reflecting their pragmatic and strategic focus.

Approach 5: participating in cross-institutional networks and initiatives

The final approach that emerged from the initiatives explored is engagement in cross-institutional SDG-based networks, initiatives and alliances of a sort that the SDGs themselves strongly encourage, particularly through SDG 17 – *Partnerships for the Goals*. These activities range from small, ephemeral groups to large, long-lasting international networks. Such cooperation is generally mentioned only in passing in the academic literature but is becoming one of the most significant avenues for university SDG engagement on the ground.

The UN Sustainable Development Solutions Network (SDSN), for example, facilitates the sharing of resources, institutional knowledge and experiences and helps to build the capacity of HEIs to respond to the challenges of the SDGs through networks and the SDG Academy. The regional Australia, New Zealand and Pacific SDSN[3] produced a report for universities titled *Getting Started With The SDGs* (Kestin et al., 2017) which outline a range of steps universities can progress through to deepen their engagement with the SDGs – beginning with mapping the existing degree of alignment with the SDGs, as discussed above in relation to curricula (Approach 1), through to mainstreaming the SDGs by moving beyond “business as usual”. This is supported by a more recent report on *Accelerating Education for the SDGs in Universities* (SDSN, 2020).

Other inter-university networks helping to build institutional capabilities for SDG L&T include the *Association of Commonwealth Universities*, the *Catalan Association of Public Universities*, the *National Union of Students* (UK) and *Universitas 21*. Smaller alliances include collaborations with industry, such as Keio University’s SDG based partnership with Japan Airlines. Some of the initiatives previously mentioned under other approaches also

have important boundary-crossing elements, such as the cooperation involved in CASE and the associated EU Knowledge Alliance, the Global Goals Teach-in led by the UK National Union of Students and the SDG International e-Tournament led by Hong Kong Baptist University.

Discussion

Comparison between SDG L&T theory and practice

Across the five practical approaches to SDG L&T we identified within universities, it is notable that they vary in their degree of alignment with the recommendations and preoccupations in the academic literature on SDG L&T. The first two approaches – focussing on curricula and pedagogy and student experience – seem as prominent in practice as they are in the research literature, perhaps because some of the academic literature is based on empirical research at universities and these elements are most amenable to academic publication. In addition, academics are often encouraged to take a scholarly approach to their education practices and so are arguably inclined to write about their SDG L&T efforts.

The third approach we identified – aligning desired graduate outcomes with the SDGs – is a relatively minor approach in practice but receives strong emphasis in the literature, perhaps because the topic lends itself to normative commentaries and theorising. The fourth and fifth approaches – institutional leadership and capability building and participating in cross-institutional initiatives – seem far more prominent in practice than they are in the literature. This is likely to be because such activity is generally conceived as the context for, not content of, research and publication. It is also as often led by professional staff (administrators) as academic staff, and the former are less inclined to publish. A comparison between the focus in SDG L&T theory and practice is summarised in [Table 2](#).

The SDGs call for a focus on how things are done (the process), along with what things are done (the outcome). Research indicates that HEI leadership teams (and supporting governance and government entities) are not yet enacting the ethos of the SDGs, nor pursuing necessary societal transformations ([Bell et al., 2017](#)). Thus, emerging institutional processes and phenomena such as the advent and role of international networks are in themselves worthy of reflection and publication. In particular, the question of how they relate to the other approaches such as graduate outcomes and student experience deserves research attention particularly within the critical, emergent area of online L&T.

Online SDG L&T

The question of how universities are progressing SDG L&T brings us to the associated question of what role online technologies are playing. All universities are having to adapt to the COVID-19 crisis, which is disrupting the systems and structures that are set up to deliver on the SDGs. For this and other reasons, a growing number of universities are

Approach	Theory (academic literature)	Practice (university applications)
1. Designing curricula and pedagogy to address the SDGs	Strong focus	Strong focus
2. Orienting the student experience towards the SDGs	Strong focus	Strong focus
3. Aligning graduate outcomes with the SDGs	Strong focus	Weak focus
4. Institutional leadership and capability building	Moderate focus	Strong focus
5. Participating in cross-institutional networks and initiatives	Moderate focus	Strong focus

Table 2.
Comparison between key foci in SDG L&T theory and practice

enthusiastically embracing online teaching. Open online universities are emerging, shifting part of the market away from traditional face-to-face HEIs. What all of this means for the HE sector's ability to promote and enact the SDG ethos is unclear. But, given that harnessing L&T for the SDG agenda requires broad engagement across the HEI sector (Steele and Rickards, 2021), it is clear that SDG-oriented efforts need to consider the implications of the online turn in HE.

In terms of the 150 initiatives analysed, at least 41 were fully designed for online L&T, including nine MOOCs. All of these initiatives are no doubt enabled (or constrained) by the quality of online communications, including external communications of the sort that allowed us to find them through our web-based search. This suggests that SDG L&T is relatively robust to external pressures to move L&T online (e.g. COVID-19) and that some universities and educators have embraced this move voluntarily for its perceived benefits (some of which are discussed below). There is, however, a paucity of research in this increasingly important area.

The turn to online education is of consequence to L&T *on* and *for* the SDGs in unexamined ways. As mentioned, we were unable to identify existing literature on this relationship and flag it here as an area for future research and practical experimentation. In particular we briefly raise two main issues that indicate that online education has the potential to either enhance or undermine SDG L&T.

Questions of access and equity

It is widely considered that online education can improve educational access, as called for by SDG 4. When it includes asynchronous access and engagement it can provide flexibility for students with competing obligations outside of study (like work, family or other commitments) and/or mobility difficulties, increasing learning accessibility and thus likelihood of success for both young and older students (Ahel and Linggenau, 2020). MOOCs and other digital learning innovations can increase students' understanding of the SDGs and build related competencies, especially in process and project management (Barth and Burandt, 2013; Bell *et al.*, 2017; Gallagher, 2018). Online education can provide new ways to reach more students and help educators build novel skills and capabilities, such as the use of lecture recording functions and other digital technologies (Leire *et al.*, 2016). This can lead to an improved reach and quality of education delivery for online, blended and face-to-face environments, while making SDG learning more interesting, engaging and rewarding. New "more-than-real" spaces (McLean, 2020) are being constantly (co-)created through the internet, potentially making education more available and accessible. Flexibility in learning modes can also enable greater interdisciplinary and transdisciplinary approaches to L&T and boost lifelong learning – both of which are critical for transformational SDG outcomes (Bell *et al.*, 2017; Gallagher, 2018).

The online turn also addresses the SDGs directly. SDG capacity and expertise within universities at regional and global levels is a key tenet of the 2030 Agenda itself, and in particular SDG 17 ("Partnerships for the Goals"). Our research, notwithstanding limitations, suggests that SDG initiatives in HEIs might be unevenly spread across regions and countries, reflecting the broader disproportionate geographic representation of universities within global rankings. To the extent this is the case, it highlights the need for cross-border and transcontinental knowledge sharing, partnerships and collaboration on SDG L&T, in line with SDG 17. Many of the targets within SDG 17[4] have implications for how HEIs can lead, facilitate and drive international cooperation and partnerships for the broader SDG agenda through capacity-building, technology sharing, public-private and civil society collaboration and multi-stakeholder partnerships (Tandon and

Chakrabarty, 2018) and policy development. All of this points to the need for better resourced HEIs and higher-income countries to provide less well-resourced institutions in middle- and lower-income countries with the pathways, funding and support to implement transformative SDG initiatives within their universities and societies more broadly. Further, as previously mentioned, SDG 4 itself is a key part in realising the 2030 Agenda and provides the enabling environment for SDG 17 to be achieved through universities with online components of knowledge transfer, training and L&T becoming increasingly important in cross-institutional, regional and international collaboration and relationship building.

However, there are also well documented limitations associated with online education (Ahel and Lingenau, 2020; Barth and Burandt, 2013; Bell *et al.*, 2017; Gallagher, 2018; and Leire *et al.*, 2016) that threaten to reinforce the sort of inequalities the SDGs are trying to address, if they are not tackled head-on. The availability of an online program or course/subject on the SDGs such as a MOOC does not necessarily imply greater accessibility. MOOCs and other online e-learning platforms for the SDGs depend on computer, electricity and internet access, as well as digital literacy, skills and confidence in the online world (Gallagher, 2018). If adjustments are not made to address these factors, online L&T can further exacerbate educational disadvantage and rural isolation (Karena, 2010; Parker *et al.*, 2016). In terms of “time poor” students, a purely synchronous mode of online delivery can undermine their choice and flexibility in terms of engaging in learning, in much the same way as face-to-face modes. Online students disadvantaged by the limitations of online L&T environments – whether due to physical, temporal or technological constraints – may fail to develop the same student/graduate competencies and attributes.

Uncritical applications of online learning can also result in lower student participation, poor results and limited learning outcomes (Barth and Burandt, 2013). Compared to traditional, face-to-face models of HE, student retention and completion rates in MOOCs are particularly low (Leire *et al.*, 2016; Gallagher, 2018). As MOOCs do not provide formally recognised qualifications or accreditation, graduates leave courses with nothing to show for their participation. This raises questions around value and equity. Difficulties also arise around the quality assurance of MOOCs and inherent cultural biases depending on the teacher delivering the content and the demographics of the students participating (Gallagher, 2018).

For often poorly paid and trained educators, online L&T can also increase the pressure to be technically proficient and, in many cases, to have personal access to the required technologies and electricity – raising questions of equity with HEI employment. As more online courses are offered to more and more students, the overall quality of education being provided may fall if teacher–student engagement time decreases while teacher workloads concurrently increase (Ahel and Lingenau, 2020). All of these questions of equity need to be built into the design of online education, most especially that on and for the SDGs. The latter could lead the development of more reflexive and practically inclusive approaches.

Questions of transformational change

Alongside issues of access and equity, it is also worth considering questions pertaining to transformational change. Online education may be increasing student awareness and knowledge of the SDGs but is it enabling the sort of transformative L&T the SDGs require?

While there are many examples of HEIs actively or incidentally seeking to integrate the SDGs into different areas of curricula and L&T, there is a need to question how effectively these approaches actually build the desired competencies, attributes and employability of

students/graduates. Arguably, the majority of existing initiatives involve top-down L&T approaches that do not yet create the transformative approaches the SDGs call for. There is a risk that the SDGs are still being treated as a discrete topic area, rather than integrated across L&T as the new *modus operandi*. The ESD, EfS and more recent SDG literature all suggest that transformational approaches are likely to be those that are student-driven, with a strong emphasis on the learner and participatory approaches to knowledge generation and acquisition (Bart *et al.*, 2016; Buil-Fabrega *et al.*, 2019; Zamora-Polo and Sanchez-Martin, 2019). This is not going to be achieved if online offerings from HEIs are seen as simply a cheaper alternative to traditional teaching.

Arguably, many online L&T initiatives such as MOOCs do not yet manage to offer online students a transformational, student-centred learning experience. It seems the dominant approach is the formal *teaching* – rather than student-driven *learning* – of SDG skills, competencies and attributes. Indeed, the majority of online initiatives observed fell under Approach 1 (“Designing curricula and pedagogy to address the SDGs”), with the fewest online initiatives categorised under Approach 2 (“Orienting the student experience towards the SDGs”). Online L&T on the SDGs may be raising students’ awareness of the SDGs and broader 2030 Agenda, but it does not yet appear to be equipping students with the tools required for effective implementation of the goals, nor achieving the outcomes called for under SDG 4. Among the improvements needed are more evaluations that seek direct student feedback, testimonials and participation in reflecting on the success of approaches used to date.

For example, Barth and Burandt (2013) suggest the following benefits of online sustainability-based L&T, which could help achieve transformational SDG education:

- the facilitation of intercultural perspectives – the ability to bring global perspectives into SDG L&T;
- interdisciplinary communication and knowledge generation – focussing on cross-disciplinary and transversal understandings; and
- experience in process and project management – a foundational aspect of student-directed L&T.

There are clear connections here with the vital SDG competencies previously outlined of systems thinking, values thinking, action learning, interpersonal skills, strategic management, integrated problem-solving, self-awareness and transversal and anticipatory competencies (Moon *et al.*, 2018; Riechmann *et al.*, 2017; Straková and Cimermanová, 2018).

A shift away from current perceptions of online learning as an afterthought or nice “add-on” to HEIs’ face-to-face education offerings, towards online learning as a worthwhile and meaningful stand-alone form of education, could also assist in reframing current dominant, top-down and limited approaches to online L&T on the SDGs. Viewing digital/online spaces as “more-than-real” (McLean, 2020) rather than “virtual” or “intangible” would further help to give legitimacy and value to this mode of SDG L&T. The competencies sought in students through SDG L&T (as above) need to be applied to such online L&T itself. Before designing or implementing initiatives, universities must consider how they want students to be affected and what students need to do themselves to help enable this. This is about not only ensuring that institutional capability building matches the ethos of the SDGs, but also that (as ESD and EfS literature emphasises) the effects of the hidden curriculum and broader influences of a university setting on students are considered. This includes subtle or unconscious messages that students might receive through HEI actions, such as how early career research and teaching staff are treated and what opportunities they have to engage with university leaders and cross-institutional initiatives.

Limitations and further research

Through our desktop research, we set out to provide a high-level, interim indication of emerging SDG L&T at HEIs and their inclusion of online approaches. As such, a full examination of the challenges of linking the SDGs to online L&T competencies was beyond the scope of this particular study. Further studies might consider the extent to which SDG competencies are met by the particular characteristics or advantages of online SDG L&T. This might use [Barth and Burandt's \(2013\)](#) principles and benefits as a starting point (for example).

While it was apt that a study into online L&T on the SDGs should be undertaken via the internet, this was not without its limitations. Online information about SDG initiatives was often brief and incomplete (sometimes no more than a couple of sentences on a university webpage), meaning that assumptions had to be made about the nature and implementation of initiatives, such as the mode of delivery and type of students involved (i.e. undergraduate or postgraduate). This made it difficult to assess the level of student involvement – whether they were active or passive participants – which consequently impeded our ability to draw conclusions about the transformational nature of initiatives (though making judgements or assessments about the quality of initiatives was not the intent of the study). Collection of desktop data through internet-based searches also resulted in a potential selection bias towards initiatives that had some component of online L&T (even if not explicitly stated). Further research might consider including other modes of data collection, such as semi-structured interviews, to gain a more complete picture.

Limitations also arose from the sample of universities which used existing ranking schemes and the Australian context of this project. Most of the sampled universities were identified through the 2019 *THE Impact Rankings* which assesses a range of university activities – research, outreach and stewardship. This limits how precise it is as a tool for identifying data relating specifically to L&T initiatives. While it appeared that the Impact Rankings included a number of small- to medium-sized HEIs that are not typically represented in conventional global ranking indices, we did not consider the demographics of each of the 179 HEIs that we sampled in depth (such as student numbers or composition) and, therefore, cannot draw conclusions about the implications of our research for different sized universities. Further, the Impact Rankings and other rankings used favoured higher income countries and regions. Combined with the focus on Australian universities, this means the sample is not globally representative. This was further compounded by the fact that searches were conducted in English, precluding representation of universities where English is not adopted as a language of L&T.

The main contribution of this paper lies in its exploratory nature and novel focus of the intersection between the SDGs and online L&T. Confirmative generalisations in a new or emerging field such as this would be premature ([Stebbins, 2001](#)), and so this study should be seen as part of the bigger picture that has yet to be fully mapped or understood. We hope other researchers will take up this challenge of linking SDG L&T and online education to explore its role in HE and society's SDG efforts.

Conclusions

Online platforms have the potential to support the wider integration of SDGs across all areas of HEI L&T. But the wider implications of the digital turn also underline the need to critically and empirically engage with what “transformational” education means in the context of the SDGs. Online education and the SDG L&T can become mutually beneficial through a more exploratory, democratic and, student-led approach. This includes acknowledging that online education and L&T *for* and *on* the SDGs are both subject to the

same challenges that the 2030 Agenda is trying to address. This context needs to become central to the content and practice of L&T in HEIs.

We observed five broad approaches that HEIs are currently pursuing to embed the SDGs into online (and offline) L&T, based on 150 different initiatives:

- designing curricula and pedagogy to address the SDGs;
- orienting the student experience towards the SDGs;
- aligning graduate outcomes with the SDGs;
- institutional leadership and capability building; and
- participating in cross-institutional networks and initiatives.

Each approach varied in their degree of alignment with the recommendations and preoccupations in the academic literature on SDG L&T and in their relevance to online L&T environments.

Overall, this research provides a timely exploration of the challenges and potential of SDG L&T in HEIs. While preliminary analysis indicates there is still much to do to ensure that educational experiences offered by universities are truly transformational, the array of initiatives explored in this paper offers ideas and inspiration for educators and institutions grappling with the dual challenges of moving online and embedding the SDGs into L&T.

Notes

1. United Nations Website – SDG 4 Quality Education url: <https://sdgs.un.org/goals/goal4>
2. The Times Higher Education (THE) *Impact Rankings* (2019) url: www.timeshighereducation.com/rankings/impact/2019/overall#/page/0/length/25/sort_by/rank/sort_order/asc/cols/undefined
3. SDSN Australia, New Zealand and Pacific url: <http://ap-unsdsn.org/>
4. United Nations Website – SDG 17 Partnerships for the Goals url: <https://sdgs.un.org/goals/goal17>

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