Advance HE

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Assessment and Feedback in a Post-Pandemic Era: A Time for Learning and Inclusion

Patrick Baughan

Part C: Assessment and sustainability

Design principles for assessment of sustainability teaching

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Abstract

This article gives an overview of effective assessment practice for sustainability teaching in higher education. After briefly reviewing ways in which sustainability teaching is embedded in curricula, we consider attributes of sustainability assessment including the role of competences and the wider pedagogy of sustainability teaching. We then propose a framework of nine design principles for sustainability assessment. We argue that assessment of sustainability learning is most effective when aligned with curricula that are learner-centred, flexible, future-facing, active and experiential, collaborative, multidisciplinary, authentic and situated, affective and enquiry-based. These attributes promote the systemic thinking needed to explore global sustainability challenges, and they help develop self-regulated learning. A brief case study illustrates some of the principles and outcomes around equality, diversity and inclusion (EDI). We conclude that effective sustainability assessment requires whole-institution adoption of future-facing and flexible pedagogies.

Introduction to sustainability teaching and assessment

Quality, modern higher education (HE) must equip graduates with the critical thinking and problem-solving skills necessary for engaging with and addressing current and future socioeconomic and environmental issues. Accordingly, the UK government published its strategy for sustainable development in 2005 (HM Government, 2005) highlighting the crucial role of education in raising awareness of sustainability, and positioning sustainability principles at the core of the education system. Since then, detailed guidance on learning and teaching sustainability has been published (QAA and Advance HE, 2021; Sterling, 2012), sustainability is now included in many subject benchmarks, and sustainability teaching has become a priority for higher education institutions (HEIs) in the UK.

Despite the plethora of publications considering Education for Sustainable Development (ESD), there are limited examples of institution-wide reform and re-orientation of whole curricula towards sustainability (Leal et al, 2018). We are unlikely to reap the rewards of highly effective ESD if sustainability is merely seen as an add-on to teaching content. Rather, a transformative approach is needed, encompassing all aspects of curricula. In a quality education system where learning activities, content and assessment are constructively aligned, assessment design will be integral to the success of ESD.

In this paper, we consider the pedagogy of sustainability teaching and implications for assessment design. We propose a framework of assessment design principles that align with sustainability-focused, learner-centred, authentic and flexible learning, and which collectively promote core characteristics of sustainability-literate learners. A brief case study illustrates some key concepts. Subsequently, we argue that, in the wider context of future-facing, flexible assessment pedagogies, ESD can help HEIs to fully embrace learner diversity and inclusive curricula.

What is Education for Sustainable Development (ESD)?

> "ESD empowers learners to take informed decisions and responsible actions for environmental integrity, economic viability and a just society, for present and future generations, while respecting cultural diversity..... ESD is holistic and transformational education which addresses learning content and outcomes, pedagogy and the learning environment. It achieves its purpose by transforming society." (QAA and Advance HE, 2021, 8)

ESD addresses four top-level themes: global citizenship; environmental stewardship; social justice, ethics and wellbeing; and futures thinking. These provide a framework within which the big global issues enshrined in the UNESCO Sustainable Development Goals can be addressed.

Integration of ESD in curricula

ESD is integrated into curricula to varying degrees. At a basic level there may be minor modifications to curriculum content, or reference to sustainability in professional development planning (PDP). New modules might be introduced or encouragement given for sustainability-related dissertations and work placements. ESD may also be provided via cross-disciplinary and extra-curricular programmes. At an optimum level, sustainability is infused throughout the curriculum as well as in all institutional processes (Sterling, 2012). The degree and mechanism of integration may influence the design of assessment for sustainability learning, or indeed determine if sustainability is actually assessed at all. As with any discipline there ought to be clear alignment between teaching and assessment, but we now explore particular attributes of sustainability assessment as essential underpinning for development of a sustainability assessment strategy.

Attributes of sustainability assessment

Core competencies

Regardless of how ESD is integrated into curricula, most UK HEIs identify a set of graduate outcomes that integrate sustainability principles. The National Union of Students has also produced a set of sustainability attributes (NUS, 2019) to accompany its Responsible Futures institutional accreditation scheme (NUS, 2021). Some graduate outcomes are familiar and reflected in standard learning outcomes and assessment criteria (eg critical thinking and communication). Less familiar outcomes are specific to ESD: action for sustainability, systems thinking, interdisciplinarity, agency and

commitment to social justice, equity and diversity. Also implicit is self-regulated learning: the cognitive, metacognitive and resource management strategies students may adopt to control and regulate their own learning (Pintrich, 1999). Unesco (2017) identifies three groups of core ESD competencies at all levels of education:

(a) Ways of *thinking:* Systems, future and critical thinking

(b) Ways of *practicing:* Strategic, collaborative and with integrated problem-solving

(c) Ways of *being:* Self-aware and normative

Outcomes and competences such as these can be adapted to form the basis of module and programme learning aligned with assessment activities, and examples are provided by QAA and Advance HE (2021) across the full spectrum of knowledge, skills and attributes.

Pedagogy of sustainability learning and assessment

These competences imply a sustainability pedagogy distinct from traditional pedagogies (Table 1) and effective sustainability assessment strategies should aim to engage with a range of these characteristics.

Table 1: Pedagogical implications of ESD
(adapted from Sterling, 2004, 2012, 2018; Tilbury and Wortman, 2004)

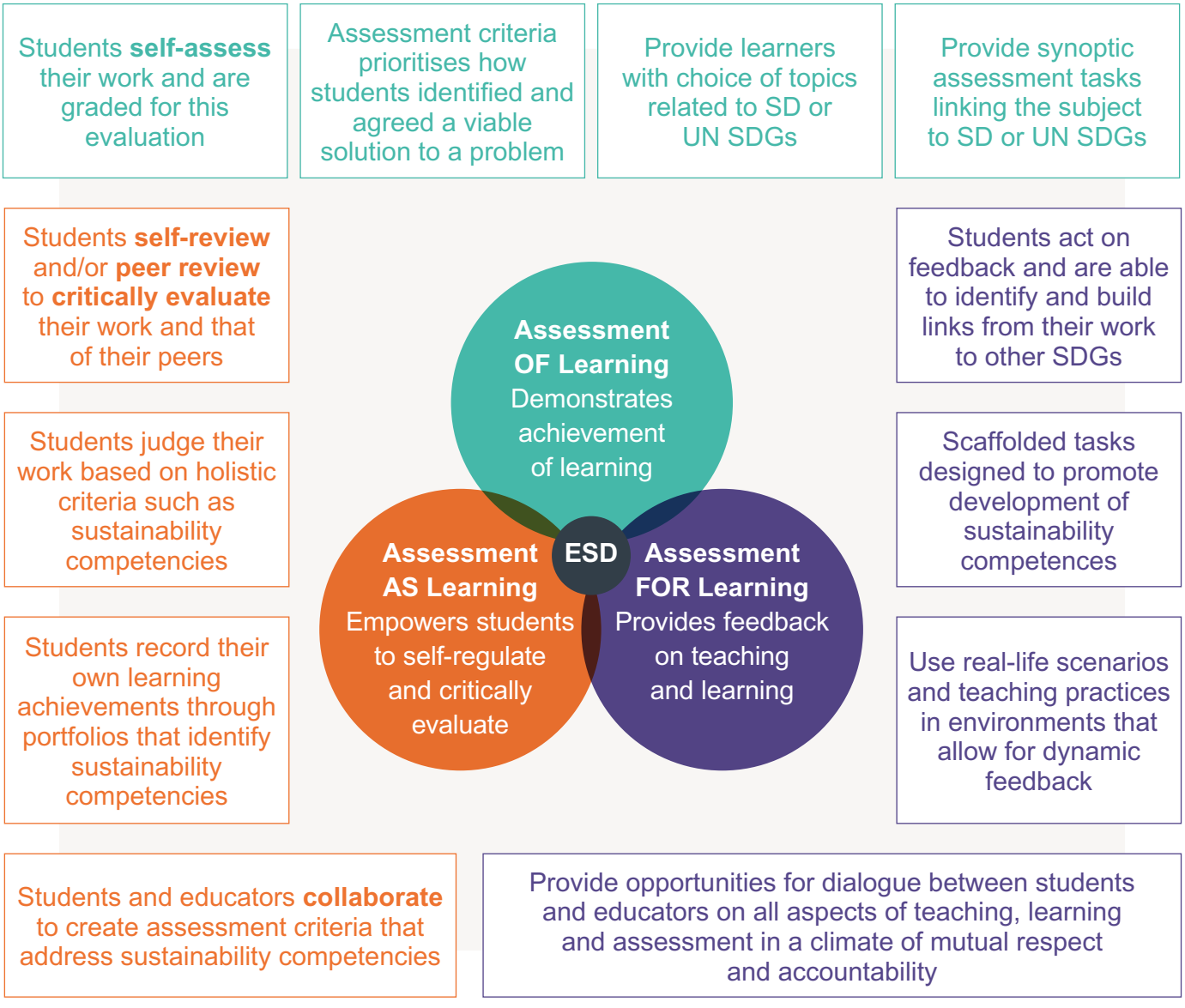
Traditional pedagogy	Sustainability pedagogy
Teacher-centred, top-down instruction	Learner-centred, experiential and situated learning
Transmissive, passive learning	Active learning through discovery
Limited learning modes	Diverse modes of teaching and assessment
Individual learning	Collaboration and peer learning
Discipline-based	Inter- and multi-disciplinary with systemic thinking
Theory and abstract knowledge	Orientated towards the theory-practice nexus
Accumulating fixed knowledge, curriculum content dominant	Provisional knowledge and self-regulated learning
Cognitive outcomes	Whole person outcomes

Characteristics of effective sustainability assessment

Given the wide variety of learning outcomes and competences for sustainability teaching, there are numerous potential methods of assessment. However, the assessment strategy should foster the holistic and transformational essence of ESD (QAA and Advance HE, 2021).

Rather than focusing merely on assessment *of* learning, one can use the concepts of a) assessment *for* learning and b) assessment *as* learning, as a useful overarching basis (Keamy et al, 2007; Dann, 2014). Examples of assessment strategies linked to these approaches are shown in Figure 1.

Figure 1: Assessment for, as, and of learning for sustainable development
(from QAA and Advance HE, 2021, adapted and available under CC license from the National Forum for the Enhancement of Teaching and Learning in Higher Education, 2017)



Design principles for sustainability assessment

Building on themes in Table 1, we propose nine core design principles for ESD assessment. Many of these assessment approaches are emerging and so there is a need to provide effective scaffolding for learner guidance and support. This is particularly true where these assessment elements sit in strong contrast to other, more traditional, approaches in the programme, or where there is considerable variation in assessment methods.

1. Learner-centred

Learner-centred assessment is necessary to achieve the self-regulated learning and increased agency that are integral to ESD. Through the choices learners are empowered to make they will have agency to influence, direct and regulate their own path through study (Keamy et al, 2007). Learner-centred approaches also promote EDI values, enabling a more personalised educational experience capable of meeting the needs of a diverse student body. In parallel with this philosophy, learners will also engage conceptually with the sustainability challenges of global diversity, reinforcing understanding that to achieve sustainable futures may require individuals and communities to modify their values, attitudes, policies and actions (Sterling, 2012). The learner-centred model of assessment challenges traditional learner-tutor power relations; students become partners in co-creating curricula rather than recipients, and the teachers' role is that of facilitator and mentor.

2. Flexible

Assessment is often a key motivator for student learning, but can sometimes jar with the complex practicalities of students' lived experiences. Rigid approaches to assessment also conflict with the increasing diversity of learners in terms of their educational, circumstantial, cultural and experiential backgrounds. Introducing flexibility into assessment can reduce these barriers and provide new opportunities for students to learn, and to demonstrate their achievement. For example, allowing choice around curriculum content (see case study) engages learners as they become empowered to select themes of relevance to them, matching their aspirations, intrinsic interests, experience and background. Flexibility is also possible around the format or method of assessment, the degree of self-direction accommodated, and the timing and weighting of assessment (Rideout, 2018).

3. Future-facing and global

Sustainability issues reside within dynamic and rapidly changing systems (Sterling, 2012). As such, learning outcomes and assessment need to be sufficiently flexible and open-ended both to allow for uncertainty and change, and to encourage critical and creative thinking and problem solving (QAA and Advance HE, 2021). Assessment methods that accommodate the provisional nature of knowledge in 'wicked' sustainability problems can be very effective in growing learner confidence and capability. Learners can be encouraged to stretch beyond mere problem-solving, to deconstructing assumptions, imagining alternative scenarios, and formulating novel solutions. For example, learners can be invited to respond to an initial scenario. In a second phase they respond to a new development

of that scenario, and then a third phase and so on. This reinforces the dynamic nature of sustainability issues and can be experienced in the form of an engaging game-play to discover what might happen next, or what does it look like from x,y,z perspective? Future-facing, scenario-based assessment needs space for ideas to emerge, but can be liberating and highly creative.

4 Active and experiential

Kolb's experiential learning cycle (1984) begins with a new experience or novel situation, followed by reflection and observation of links to prior experience or understanding, analysis to formulate concepts, and application to test hypotheses. Iteration provides multiple opportunities for formative assessment. Several assessment methods suit this active learning approach including:

(a) Applying theory to practice in case studies based on simulations or 'live' projects. The campus and local community can be used to great effect as a 'living laboratory' (eg its physical environment, resource usage and waste generation, food supply, community sustainability projects).

(b) Learning portfolios that capture reflection, progression, and a showcase of finished products (Nicholson, 2018).

(c) Group oral examinations (viva voces) via group discussion, interview or post-presentation Q and A. Grimes and Gibbons (2016) acknowledge the challenges of the viva, but argue validity and reliability can be achieved with clarity (what is being assessed during the viva), alignment of questions with learning outcomes, and use of safeguards (eg double marking, video recording). Group assessment tends to mitigate individual barriers, and marks can be awarded on an individual basis.

5. Collaborative

Team-based learning and assessment are central to ESD, and strategies can be put in place to overcome well-known challenges in assessing collaborative work (Webb, 1995). Openness about the challenges is key in effective management of team dynamics and in promoting peer and social learning; students learning from each others' knowledge, shared experiences, and dialogue around values, attitudes and beliefs, tackling bias and differences of perspective. These activities can transform students' diversity awareness and self-recognition of agency. Teamwork training is a valid sustainability objective and can be incorporated into learning activities. Large variations in effort and achievement can be tempered using peer review (Nicholson, 2018), or through individual assessment of collaborative activities.

6. Multi-disciplinary

To understand and solve wicked global sustainability problems requires both systems thinking and multidisciplinary input (Sterling, 2012). Assessment that promotes systems thinking and synthesis across disciplines has the power to transform learner perceptions of the boundaries of their knowledge, to discover interests and opportunities beyond their discipline, and to grow their

confidence around future potential and agency. Students able to grasp the need for cooperation and collaboration will also be better able to identify connections between sustainable development and their academic discipline (QAA and Advance HE, 2021).

7. Authentic and situated

Learning derived from assessment of theory only may be abstract, lacking context, while learning situated in the real world and engaging with a community of practice can be more effective (Lave and Wenger, 1990), even when incidental or less formal (eg linked to extra-curricular activities). Deeper learning is possible where assessment requires complex links to be made between theory and practice. Engaging with real-world problems provides authenticity, a sense of urgency and purpose, and assessment can be linked to real places and people, potentially engaging external stakeholders in the assessment process and adding a layer of accountability. A common assessment approach requires learners to collect and/or analyse data, leading to recommendations that have a real influence in the world. An example is given by Cross and Congreve (2020) of students who compared crop yields with other environmental and demographic data, leading to suggested improvements to farming practices in a developing country. In addition to the obvious agency of these students, they also learned about the value of citizen science and its role in managing climate change. Other authentic assessments are possible, including providing interpreted information for the public, preparing policy briefing notes and working alongside employers to solve specific problems. The authors have employed work placement students from various disciplines to create sustainable development resource packs as part of their assessment. Hypothetical scenarios replicating real situations can be used in semi-authentic assessment but without the associated practical constraints.

8. Affective

Real sustainability problems are intrinsically multi-dimensional, involving the whole person and their affective, cognitive and physical domains (Sterling, 2012). ESD assessment can extend beyond comprehension to encourage reflection, and engagement with values, attitudes and behaviours (QAA and Advance HE, 2021). For learners, this can help develop self-regulation and sense of agency, and as such, can be transformative (Rieckmann, 2018). Challenging ethical issues underlie many sustainability problems and they can invoke strong emotions. Handled sensitively, this can provide opportunities for affective learning. Assessment examples include reflective logs, video diaries and blogs. Role play, debates, and mock public enquiries can work well too as they encourage deep exploration of issues from widely different perspectives – some examples are given by Sterling (2012).

9. Enquiry-based

Enquiry-based learning (EBL) is a constructivist approach, building from an open-ended research question to a rich exploration of issues. During enquiry, significant acquisition and development of associated skills may occur (eg information literacy, research design, data analysis, communication). EBL is inherently learner-centred, multidisciplinary, experiential and collaborative, and an ideal

pedagogy for sustainability teaching and assessment (Wiek et al, 2014). While EBL can address the complex systems integral to sustainability issues, assessment tasks can be simple, open and flexible. This encourages learners to identify boundaries, recognise and evaluate constraints, examine issues from different perspectives and undertake scenario thinking. Outputs can include storyboards, creative team presentations, research enquiry reports and development proposals. Problem-based learning (PBL) focuses on narrow or closed questions for which there is a known or determinable solution, and lends itself to more conventional assessment outputs such as using sustainability principles as the basis for developing, redesigning or rethinking a process, producing policy framework, designing an object or conducting data analysis. EBL is used as the primary learning and assessment method in the short case study presented below.

Case study: Professional Geographer

Curriculum: around 100 first-year undergraduate Geography, Physical Geography, and Human Geography students take this 15-credit core module at the start of their three-year degree. Module aims are to develop academic and professional skills and this is reflected in the learning objectives around collaborative enquiry, critical thinking, data handling, communication and professional development planning. The Sustainable Development Goals provide a framework within which mixed discipline teams collaborate in a learner-centred EBL project to research a global geographic challenge of their choice. Early sessions use object-based triggers to introduce systemic thinking in sustainable development issues and to stimulate team project discussions. Teams are encouraged to explore case studies and consider varying scenarios in their thinking.

Module assessment: there are two assessment elements: (1) An end-of-module team presentation with integrated Q and A. Presentations include critical review of literature, analysis of secondary data supporting a central thesis, discussion of counter theses, and recommendations and/or conclusions. Subsequently, students peer assess team member contributions. (2) An individual digital portfolio containing a written critical review of an element of the team project and a PDP including self-audit (academic skills, teamworking and leadership), reflection and evaluation. Considerable flexibility in portfolio design encourages creativity and is incentivised in the grading scheme.

Implementation: facilitated team discussions, which gradually open up the affective domain, are supported with mini skills-focused workshops and tutorials. There are multiple opportunities for formative feedback throughout, but the emphasis is on assessment *for* learning, with elements of self- and peer- assessment enabling assessment *as* learning.

Outcomes: evidence from module and assessment evaluation indicates positive outcomes for learners:

+ tangible growth in sustainability literacy
+ development of multiple academic and professional skills
+ empowerment through team project design

+ significant progression in self-regulation, confidence, perceived potential as agents of change, and identity as global citizens
+ improved grasp of discipline boundaries, opportunities and benefits of interdisciplinarity
+ peer learning and raised diversity awareness
+ re-evaluation of prior sustainability knowledge, attitudes and values in the light of academic enquiry and critical analysis of contrasting viewpoints.

Challenges: in this multidisciplinary, team-based learning there were initial challenges following team formation and during project scoping. However, careful scaffolding around activities and provision of specific teamwork training, equipped students with the knowledge and skills needed for effective peer learning. Tackling sometimes difficult group dynamics and addressing the complex cultural issues surfaced by projects, had the positive impact of raising diversity awareness, fostering reflection on differing perspectives, and valuing difference.

Conclusions

Effective assessment of sustainability depends on alignment with learning outcomes that reflect principles of learner-centred, flexible, future-facing, experiential, collaborative, multi-disciplinary, authentic and affective learning. Formulating and verifying these learning outcomes is challenging and needs careful consideration, but their success, as observed through student assessment, can be measured against institutional policy and resources (Lockhart, 2018).

The assessment environment characterised in this paper aligns remarkably well with the synopsis of flexible pedagogy by Ryan and Tilbury (2013). They identify core future HE teaching challenges around learner empowerment, future-facing education, curriculum decolonisation, transformative capabilities, boundary-crossing, and social learning. These characteristics are integral to sustainability education, underlining the crucial role of this paradigm in HE.

Many of the design principles discussed herein represent key traits of inclusive curricula; learning and assessment environments, resources and methods that minimise barriers to engagement. For example, learner-centred and flexible assessment can provide universal access to learners; authentic, experiential, affective and collaborative assessment can reflect and value the diversity of learners; and future-facing, global and multidisciplinary assessment can equip students with agency in the real world.

In HE, there are limited examples of whole curricula being reformed and re-orientated towards sustainability (Leal et al, 2018). Modular delivery of sustainability education in discrete packages is much more common. Within such structures, local interventions accompanied by novel assessment strategies can create imbalance, incoherence and lack of progression between modules and different parts of a programme (Cross and Congreve, 2020). Learning from assessment then takes place in discrete chunks with a focus on problems, rather than a progressive scaffolding across the breadth

of sustainability competences and attributes that can lead to discovery of solutions. One practical approach to embedding ESD across curricula and assessment strategies begins with the identification and exploration of societal, environmental and economic themes and their interconnections, in parallel with a re-evaluation of the pedagogy for delivery. Alternatively, assessment and associated skills and knowledge can be mapped onto the United Nations Sustainable Development Goals (SDGs). This approach brings a tangibility to the otherwise challenging aspects of ESD (Leal Filho et al, 2019). Effective ESD integration in HE needs a whole-institution approach to curriculum design (Leal et al, 2018), that reimagines and transforms curricula, campus operations, organisation of services, student partnership, community interactions, and research (Buckler and Creech, 2014). Only then will HEIs become experiential places of learning and assessment for sustainability (Rieckmann, 2018).

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References

Buckler, C and Creech, H (2014) *'Shaping the Future We Want. UN Decade of Education for Sustainable Development (2005-2014), Final Report'.* Paris: UNESCO. Available at: unesdoc.unesco.org/images/0023/002301/230171e.pdf [accessed 6 April 2021].

Cross, I D and Congreve, A (2020) 'Teaching (super) wicked problems: authentic learning about climate change', *Journal of Geography in Higher Education,* 1-26. Available at: doi.org/10.1080/03098265.2020.1849066

Dann, R (2014) 'Assessment as learning: blurring the boundaries of assessment and learning for theory, policy and practice', *Assessment in Education: Principles, Policy and Practice,* 21 (2): 149-166.

Grimes, R H and Gibbons, J (2016) 'Assessing experiential learning – us, them and the others', *International Journal of Clinical Legal Education,* 23 (1): 111-131.

HM Government (2005) Securing *The Future: The UK Government Sustainable Development Strategy,* Cm 6467. London: The Stationery Office.

Keamy, R L, Nicholas, H R, Mahar, S and Herrick, C (2007) *Personalising Education: From Research To Policy And Practice.* Melbourne: Office for Education Policy and Innovation.

Kolb, D A (1984) *Experiential Learning: Experience as the Source of Learning and Development.* Englewood Cliffs, NJ: Prentice Hall.

Lave, J and Wenger, E (1990) *Situated Learning: Legitimate Peripheral Participation.* Cambridge: Cambridge University Press.

Leal Filho, W, Raath, S, Lazzarini, B, Vargas, V R, de Souza, L, Anholon, R, Quelhas, O L G, Haddad, R, Klavins, M and Orlovic, V L (2018) 'The role of transformation in learning and education for sustainability', *Journal of Cleaner Production,* 199: 286-295.

Leal Filho, W, Shiel, C, Paço, A, Mifsud, M, Ávila, L V, Brandli, L L, Molthan-Hill, P, Pace, P, Vargas, V R, and Caeiro, S (2019) 'Sustainable Development Goals and sustainability teaching at universities: Falling behind or getting ahead of the pack?', *Journal of Cleaner Production,* 232: 285-294.

Lockhart, A S (2018) 'Monitoring ESD: Lessons learned and ways forward', in Leicht, A, Heiss, J and Byun, W J (eds) *Issues And Trends In Education For Sustainable Development.* Paris: UNESCO Publishing, pp 215-231.

National Forum (2017) *'Expanding our Understanding of Assessment and Feedback in Irish Higher Education'.* Dublin: National Forum For The Enhancement Of Teaching And Learning In Higher Education. Available at: www.teachingandlearning.ie/publication/expanding-our-understanding-of-assessment-and-feedback-in-irish-higher-education/ [accessed 6 April 2021].

Nicholson, D T (2018) 'Enhancing student engagement through online portfolio assessment', *Practitioner Research in Higher Education,* 11 (1): 15-31. Available at: ojs.cumbria.ac.uk/index.php/prhe/article/view/459/589 [accessed 6 April 2021].

NUS (2019) *'Sustainability Attributes'.* Macclesfield: Students Organising for Sustainability UK. Available at: www.sos-uk.org/resources-file/sos-uk-sustainability-attributes [accessed 6 April 2021].

NUS (2021) *'Students Organising for Sustainability UK'.* Macclesfield: Students Organising for Sustainability. Available at: sustainability.nus.org.uk [accessed 6 April 2021].

Pintrich, P R (1999) 'The role of motivation in promoting and sustaining self-regulated learning', *International Journal of Educational Research,* 31 (6): 459-470.

QAA and Advance HE (2021) *Education For Sustainable Development Guidance.* Gloucester: Quality Assurance Agency for Higher Education; and York: Advance HE (Education For Sustainable Development Advisory Group). Available at: www.advance-he.ac.uk/knowledge-hub/education-sustainable-development-guidance [accessed 6 April 2021].

Rideout, C A (2018) 'Students' choices and achievement in large undergraduate classes using a novel flexible assessment approach', *Assessment and Evaluation in Higher Education,* 43 (1): 68-78.

Rieckmann, M (2018) 'Learning to transform the world: key competencies in Education for Sustainable Development', in Leicht, A, Heiss, J and Byun, W J (eds) *Issues And Trends In Education For Sustainable Development.* Paris: UNESCO Publishing, pp 39-60.

Ryan, A and Tilbury, D (2013) *'Flexible Pedagogies: New Pedagogical Ideas'.* York: Higher Education Academy. Available at: www.heacademy.ac.uk/sites/default/files/resources/npi_report.pdf [accessed 6 April 2021].

Sterling, S (2004) 'An analysis of the development of sustainability education internationally: Evolution, interpretation and transformative potential', in Blewitt, J and Cullingford, C (eds) *The Sustainability Curriculum: The Challenge for Higher Education.* London: Earthscan.

Sterling, S (2012) *'The Future Fit Framework: An Introductory Guide To Teaching And Learning For Sustainability In HE'.* York: Higher Education Academy.

Sterling, S (2018) *'Embedding Sustainability In The Curriculum'.* Plymouth: Centre for Sustainable Futures, University of Plymouth; and Bath: University of Bath. Available at: www.sustainableeducation.co.uk/wp-content/uploads/2019/05/EmbeddingSusInCurric_UofBath_STERLING_18.pdf [accessed 6 April 2021].

Tilbury, D and Wortman, D (2004) *Engaging People In Sustainability.* Gland: Commission on Education and Communication; and Cambridge: IUCN – The World Conservation Union.

UNESCO (2017) *'Education for Sustainable Development Goals: Learning Objectives'.* Paris: UNESCO. Available at: unesdoc.unesco.org/ark:/48223/pf0000247444 [accessed 6 April 2021].

Webb, N M (1995) 'Group collaboration in assessment: Multiple objectives, processes, and outcomes', *Educational Evaluation and Policy Analysis,* 17 (2): 239-261.

Wiek, A, Xiong, A, Brundiers, K and Van Der Leeuw, S, (2014) 'Integrating problem-and project-based learning into sustainability programs: A case study on the School of Sustainability at Arizona State University', *International Journal of Sustainability in Higher Education,* 15 (4): 431-449.

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