

Guide to ESD in practice

Co-designing authentic and inclusive assessment for growing problem-solving competence

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1. Intended outcomes

1. Educators are enabled to co-design assessment that is authentic and inclusive to improve the student experience.
2. Problem-solving abilities are developed in students to increase employability.
3. Further embedding of Education for Sustainable Development in higher education with a particular focus on assessment practices.

2. Participants

A team comprised of two academics, an academic developer and a student co-designed a module for undergraduate food students with a particular focus on making the assessment authentic to the workplace and inclusive for the students, the ultimate outcome being the growth of problem-solving abilities. We believe this co-design approach for assessment could be scaled up for use by multiple academics to design assessment for their modules in virtually any discipline.

3. Activity/project

Before teaching started, and in line with institutional quality assurance procedures, the co-design process should begin with engaging representation from across the range of stakeholders. We advocate for the inclusion of the student and the employer voice, and for expert advice from an academic developer or learning designer. A range of engagement techniques can be used to solicit opinions and preferences, culminating in the creation of “assessment stories”. These are an adapted form of Agile “user stories” and help guide the design team as much as learning outcomes and assessment criteria towards the purpose of the assignment.

The design of the assessment itself is guided by the concept of assessment for learning, as well as the principles of ESD, and underpinned by a Universal Design for Learning (UDL) mindset that enhances inclusivity by celebrating learning variability. This involves reducing barriers to assessment created by assessment types, engaging learners on their personal learning journey through creating opportunities for self-reflection, choice and agency in assessment, and making sure that assessment is authentic and relevant for learners. Consultation with employers and graduates is recommended to ensure that the assessment is authentic, whereas students primarily should be engaged on inclusivity.

4. Assessment or evaluation

Evaluation of this design activity can be both quantitative and qualitative, and informed by institutional evaluation procedures. It is our suggestion that use is made of validated scales related to each of the competencies within Education for Sustainable Development (Rieckmann, 2018; Wiek et al, 2016), administered pre- and post-study to learners.

Suggestions for such validated scales include: Systems Thinking Scale (Dolansky et al, 2020) for Systems Thinking Competence, Consideration of Future Consequences Scale (Strathman et al, 1994) for Future Thinking Competence, Revised New Ecological Paradigm (Dunlap et al, 2000) for Normative Competence, Strategic Leadership Questionnaire (Pisapia and Reyes-Guerra, 2008) for Strategic Competence, the attitude towards collaboration scale taken from Denner et al (2014) for Collaboration Competence, Critical Thinking Disposition Scale (Sosu, 2013) for Critical Thinking Competence, Situational Self-Awareness Scale (Govern and Marsch, 2001) for Self-awareness Competence, and Problem Solving Inventory (Heppner and Peterson, 1982) for Problem-Solving Competence.

5. Useful resources

Denner, J, Werner, L, Campe, S and Ortiz, E (2014) 'Pair programming: under what conditions is it advantageous for middle school students?' *Journal of Research on Technology in Education*, 46 (3): 277-296.

Dolansky, M A, Moore, S M, Palmieri, P A and Singh, M K (2020) 'Development and validation of the systems thinking scale', *Journal of General Internal Medicine*, 35 (8): 2314-2320.

Dunlap, R E V L, Liere, K V, Mertig, A and Jones, R E (2000) 'Measuring endorsement of the new ecological paradigm: a revised NEP scale', *Journal of Social Issues*, 56 (3): 425-442.

Govern, J M and Marsch, L A (2001) 'Development and validation of the situational self-awareness scale', *Consciousness and Cognition*, 10 (3): 366-378.

Heppner, P P and Petersen, C H (1982) 'The development and implications of a personal problem-solving inventory', *Journal of Counselling Psychology*, 29 (1): 66.

Pisapia, J and Reyes-Guerra, D (2008) *The strategic leadership questionnaire*. Boca Raton, FL: Florida Atlantic University.

Rieckman, M (2018) 'Key themes 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 61-86.

Sosu, E M (2013) 'The development and psychometric validation of a Critical Thinking Disposition Scale', *Thinking Skills and Creativity*, 9: 107-119.

Strathman, A, Gleicher, F, Boninger, D S and Edwards, C S (1994) 'The consideration of future consequences: weighing immediate and distant outcomes of behavior', *Journal of Personality and Social Psychology*, 66 (4), 742-752.

UNESCO (2017) *Education for Sustainable Development Goals: learning objectives*. Paris: UNESCO. Available at: unesdoc.unesco.org/ark:/48223/pf0000247444

Wiek, A, Bernstein, M J, Foley, R W, Cohen, M, Forrest, N, Kuzdas, C, Kay, B and Withycombe Keeler, L (2016) 'Operationalising competencies in higher education for sustainable development', in Barth, M, Michelsen, G, Thomas, I and Rieckmann, M (eds) *Routledge handbook of higher education for sustainable development*. London: Routledge, pp 241-260.

6. Example of practice

Following a review of the BSc Food, Quality & Safety (FQSN) programme in 2021, coinciding with the release of the Independent Strategic Review of the NI Agri-Food sector, the FQSN programme was reassessed to introduce a new and innovative module, Sustainable Food Systems. This module centred around sustainability to better equip graduates with the skills and knowledge to promote change in the agri-food industry.

Students enrolled in the module ($n = 24$) completed a pre- and post-module questionnaire ($n = 21$) which contained Heppner's Problem-Solving Inventory. There was a statistically significant ($t(20) = -4.17$, $p < 0.001$) increase in self-rated problem-solving ability before ($M = 131$, $SD = 15.5$) and after ($M = 147$, $SD = 17.5$) engaging in the module.

Key learnings from this activity include that you will encounter resistance from staff and students when taking this approach, as it requires elements of creativity, confidence and willingness to try something new, and that there are many mundane institutional barriers to an ESD-informed approach, such as timetabling and room design. There can be a lack of awareness of staff around the SDGs, with a co-occurring assumption at leadership level that all staff have a deep understanding of what the SDGs are, that they are already embedding the SDGs, or indeed have a deep understanding of how to do so. There is a need to have strong support systems in place to build good practice across the institution.

This practice can be applied across all disciplines but is particularly relevant to the revised Earth Sciences, Environmental Science and Environmental Studies, and to the forthcoming revised Agriculture, Horticulture, Forestry, Food, Nutrition and Consumer Sciences.



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