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# Writing for Sustainability in Work-Based Projects

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## Abstract

Sustainability is a widely accepted integral part of engineering programmes that should be part of the fabric of the curriculum. This paper shows the conceptual and practical connection between sustainability and communication competencies in a work-based project assessment as part of a Graduate Apprenticeship (GA) programme in Scotland.

Graduate and Degree Apprenticeship programmes see apprentices work in and between two key institutions (their employer, and the university), each with their respective norms. Recognising that there are different communicative norms, an assignment for a work-based project at a modern Scottish University was altered to foster professional writing competencies. This process raised questions about the *intersections between sustainability and communication competencies* and the way these synergies could be harnessed in engineering education.

This practice paper first explores conceptualisation of sustainability and communication, before identifying the intersections between sustainability and communication, namely perspective taking; self-awareness; sense making; complexity awareness; and co-creation. These overlaps in competencies are then related to the changes made in the assignment (Canton *et al.* 2023), highlighting the importance of communication and sustainability. The findings highlight the potential, and need, for competency-driven changes to the curriculum (in this case around communication) to be carefully mapped to other competencies. The paper provides a first step towards the conceptual basis for such mapping between sustainability and communication, as well as an example of assessment practice that fosters competencies required in both fields. Future work will evaluate the impact of these practical changes on GA students, university faculty and industrial partners to further develop this practical model for fully and holistically integrating competencies for sustainability and communication into engineering curricula, particularly those that combine workplace and academic learning.

## 1 Introduction

### 1.1 Wider Context

Sustainability is widely considered to be an integral element of engineering programmes (Engineering Council, 2020; Tilley *et al.*, N.d.). That means, sustainability should not be an ‘add-on’ but should be fully integrated into the fabric of curricula, so that it does not compete with the subject content that some would see as the ‘classic’ focus of an engineering degree. Fully integrating sustainability is a particular challenge for Graduate Apprenticeships (GA) due to their structure, but successfully identifying synergies reduces the risk of overloading students with limited time resource.

GAs are work-based degree programmes delivered in Scotland based on prescribed Frameworks (SDS, 2025). They are part of a UK-wide initiative to offer the opportunity to study a degree at the same pace as a full-time student whilst working full-time in a relevant industrial position, which includes Degree Apprenticeships in England, Wales and Northern Ireland (OfS, N.d.). This work focuses on GAs in Scotland, in particular the Engineering (Design and Manufacture) (GA EDM) Framework.

GA programmes combine workplace learning and academic study, thereby giving students the opportunity to connect theory and practice. At Glasgow Caledonian University (GCU) this is done through a combination of content-focused and project modules that seek to balance the work-study-life challenge of GAs through the programme design and delivery method. Students undertake their project in real-time and focus on current issues facing their industry. This paper centres on the work-based project aspects at GCU, because of the focus on sustainability throughout the programme in these project modules.

### *1.2 Integrating Sustainability into Work-based Projects*

Sustainability is embedded throughout the GA EDM programme through both taught material delivery and by encouraging reflection on their engineering practice. Their work-based projects offer a structured opportunity for reflection, and to develop a sustainability mindset, from the first year of the programme. Another competency that is developed throughout their programme is communication, which is required both for report writing and oral presentations and taught through tailored classes and materials.

This paper showcases an assessment that harnesses the synergies between Education for Sustainability and the teaching of professional communication skills. Moving from considering these competencies separately to identifying the significant commonalities demonstrates how specific assessment practice can contribute to integrating essential learning outcomes, such as sustainability and professional communication, into work-based project assignments.

The paper outlines the conceptualisation of sustainability and communication before presenting the research findings that shaped assessment practice and identified synergies with Education for Sustainability.

## **2 Conceptualising Sustainability and Communication**

The ubiquitous use of the term ‘sustainability’ can hide its underlying complexity. Simplification commonly happens when the contested relationship between its three pillars (Purvis *et al.*, 2019) is reduced to environmental sustainability, often through association between sustainability assessment with environmental assessment (Pope *et al.*, 2004). Focussing on the wider goal of sustainable development (Royal Academy of Engineering, N.d.) can also lead to losing focus on the specific impact Education for Sustainability should have on individual students. If future engineers are to contribute towards sustainable development, they need more than declarative knowledge (Biggs & Tan, 2007, 72) about sustainability, however: students need ‘to develop competencies that enable and empower [them] to reflect on their own actions [... and] to act in complex situations in a sustainable manner – to explore new ideas and approaches and participate in socio-political processes, with the objective of moving their societies progressively towards sustainable development’ (Rieckman, 2018, 39). They need to become engineers who practice ‘sustainable engineering science [which] does not reduce complexity [...] but approaches it with a constant cycle of anticipation and adaptation as new information about feedback effects and unintended consequences is discovered’ (Seager *et al.*, 2012, 473).

To guide educational practice towards this goal, various frameworks of competencies needed for sustainable engineering practice or science have been developed. These include Engineering for One Planet (EOP) Framework (EOP Framework, N.d.), the Inner Development Goals (IDG, n.d.), Brundiens *et al.*'s (2021) key competencies for sustainability in Higher Education (HE) and those identified by Goncalves Quelhas *et al.* (2019). Although these authors categorise the competencies on which sustainable practice relies in very different ways, it is important to note that they all include competencies that relate to working and communicating with others, whether they call them interpersonal competencies (Brundiens *et al.*, 2021), communication and teamwork (EOP Framework, N.d., pp21), or just collaboration (Goncalves Quelhas *et al.*, 2019). Specific cognitive competencies related to collaboration include 'perspective taking' and 'sense making' (IDG, N.d.), aspects of which are also reflected in 'systemic thinking' and 'contextualisation' (Goncalves Quelhas *et al.*, 2019). All of them are important for decision-making in complex real-life contexts in which competing perspectives and priorities need to be balanced in a way that increases the chances of long-term benefit for multiple stakeholders, ranging from human beings to ecosystems.

The need to balance, predict and adapt to potentially contradictory demands and restrictions in complex (and messy) real life situations is also an essential feature of writing if it is understood as a cognitive activity that is employed for social interaction (Portanova *et al.*, 2017). Teaching writing then means teaching 'students to navigate the different aspects of the writing process, as well as navigate their place in complex social structures' (Canton, 2024). Creating texts that communicate successfully therefore demands many of the competencies identified as prerequisites for sustainable practice in the literature cited above.

### **3 Approach and Inputs**

The identification of the synergies between communication and Education for Sustainability happened in a two-stage process: the initial project made changes to a work-based project assessment to foster professional writing analysis of the competencies required when writing for different audiences; this work led to the hypothesis that there would be synergies with Education for Sustainability, which were then explored in greater depth.

#### *3.1 Investigating the requirements for professional writing*

For the first stage Canton & Cowell (2025) explored the perception of texts in HE and industry represented by a convenience sample of six engineers working in local companies who acted as industrial mentors to GA students and six engineering lecturers teaching on modules taken by the GA cohort. These participants read 19 authentic GA student reports, evaluated them through consensual assessment (Zahn *et al.*, 2020) before explaining their judgements in greater detail in semi-structured interviews. The findings from this process led to the development of dual assignments, which ask students to produce two reports on the same project, one for a clearly contextualised professional audience, the other for academic readers. The work-based project provides an ideal environment for the consideration of the two different audiences, because it asks students to consider business change and innovation in their workplace. Workplace readers (the employers) will therefore be interested in the specific suggestions for change made, while academic readers can focus on technical quality of the project as a reflection of student learning. Changes in the marking rubrics further reflect the different purposes both audiences bring to the reports by emphasising the decisions readers need to take with the help of the report (Canton & Cowell, 2025). An example rubric

component is shown in Table 1. The emphasis on adopting different perspectives and predicting reader responses also were the catalyst for the exploration of the similarities between the competencies required to produce successful workplace reports and to practice sustainable engineering science, as presented in section 3.2.

Table 1: Example Rubric Component (from the section for professional audiences).

Criteria	Criteria Text	Exceptional Response
A1	To which degree does the report allow managers to make an informed decision about the potential benefits of the project to the company?	The report contains all information needed to make an informed decision. It identifies an exceptionally detailed list of benefits and balances them with a detailed presentation of potential challenges (including ethics, sustainability, IP) and resources needed to give readers an exceptionally nuanced understanding of the potential impact of the project with no weaknesses.

### *3.2 Intersections between Sustainability and Communication*

To elaborate an intuitive sense of synergies between the competencies central to Education for Sustainability and those the new assignment fosters, a matrix of key competencies was created for sustainability drawn from the literature cited above and the three main changes made to the assignment (Canton *et al.*, 2023). Column 1 (see table 2) includes the sustainability-related competencies that were identified to be most relevant to the competencies required to produce this assignment. Communication is notably absent as an overall competency, as focussing on those competencies that contribute to successful communication allows a more nuanced analysis. The first two authors then independently and systematically identified significant connections between these (sustainability) competencies and the aspects of the assignment named in columns 2 to 4. Juxtaposition of the respective answers revealed a high level of agreement on main points even before discussion that led to the consensus presented in Table 2. This exercise provided a platform to further investigate these synergies and to decide whether future assessment practice would benefit from these.

## **4 Findings**

Table 2 presents the most relevant synergies between the competencies fostered by the changes made to the assignment and those included in Education for Sustainability frameworks. The third change, contextualisation of the texts to be written, is not worked out in depth in this paper, as familiarity with a specific professional context can be considered to be given in workplace learning.

## **5 Discussion**

### *5.1 Creation of Two Parts to the Assignment*

The creation of dual assignments clearly encourages perspective-taking, which is defined by IDG (N.d., 17) as ‘seeking, understanding and actively making use of insights from contrasting perspectives’. Writing the

two sections presupposes the ‘basic perspective skill’ of recognising that each view of the world is ‘an interpretation based on a limited and selective set of data and complemented by assumptions and judgments’ (ibid). At the same time, it challenges students to develop more nuanced perspective skills and ‘use of several perspectives in order to make sense of issues and processes’ (ibid).

To differentiate between one’s own and others’ perspectives, self-awareness is required. The most common interpretation as the awareness and the ability to regulate ‘of one’s own emotions, desires, thoughts, behaviours, and personality’ (Brundiens *et al.*, 2021, 21) is perhaps less immediately relevant to this assignment. Nonetheless an alternative interpretation, i.e. recognition of ‘one’s own role in the local community and (global) society’ (Brundiens *et al.*, 2021, citing UNESCO (2017), 21), is essential to recognise where others’ positionality diverges from one’s own, and is hence needed for successfully considering one’s text from different perspectives.

Table 2: Alignment Matrix for Sustainability Competencies and Assignment Changes.

Sustainability Competency	Assignment Changes		
	Two Parts	Changes to Rubric	Contextualisation
Perspective-taking (IDG)	The two parts require taking two separate perspectives.	The questions provide assistive prompts for writers to consider readers’ perspective.	Reinforces benefits from two-part assignment and changes to rubric.
Self-awareness (Brundiens, <i>et al.</i> )	Emphasis on the different perspectives of each audience prompts consideration of writer’s own place.	Considering the question from the perspective of readers requires acknowledgement of where these differ from the writer’s own perspective.	
Sense making (IDG)	Considering one perspective at a time assists with understanding the needs (perspective) of the audience.	Considering questions assists with translation of desirable considerations into effective text.	
Complexity awareness (IDG)	Considering each perspective reduces the need for simplification to deal with two at the same time.	Answering questions about purpose is a more complex cognitive endeavour than comparing a text to a list of features it must contain.	
Co-creation (IDG)	Separating the different purposes emphasises the importance of collaboration/co-creation and facilitation of decision-making for each of them.	Questions focused on decision-making assist with understanding the degree to which the decision-making process is supported by the text.	

Sense making is also essential to interpret the needs of future readers (their perspective): writers need to ‘see patterns’ (IDG, N.d., 17) to understand readers’ position and to ‘consciously create stories’ (ibid) that convey the intended message to readers. Separating two reader groups with different purposes for reading makes such patterns easier to see.

Despite the clarity gained by separating different perspectives, the ability to understand and respond to complexity remains important. Without it, writers cannot appreciate the complexity of each reader group’s perspective and adapt their writing with sufficient nuance. Furthermore, the interdependency of the two different perspectives can be seen as an example of ‘mutual interdependencies [...] that cannot be properly understood by uni-directional, uni-factorial causal relationships’ (IDG, N.d., 16). The IDGs also recognise the role of systems thinking in this competency, which Goncalves Quelhas *et al.* (2019) define as ‘the ability to identify and understand the interactions between systems and people in the social, cultural, environmental, commercial, legal and political contexts where they operate.’ Understanding new reader groups relies on such understanding, since the needs of readers are shaped by a variety of factors from the domains listed above.

If communication is regarded as ‘a joint accomplishment of the participants’ (Krauss & Fussell, 1996, 683), setting dual assignments also emphasises the importance of co-creation (IDG, N.d., 21) or collaborative competency (Brundiers *et al.*, 2021, 16.). This is particularly pertinent for the professional text, as its main purpose is to drive forward workplace projects by facilitating decision-making about these projects (aimed at innovation and business change) within companies.

## *5.2 Changes to the Rubric*

The changes to the rubric further emphasise the use of texts for future decision-making, whether these decisions concern workplace projects or the marks lecturers assign. A rubric that contains questions about the degree to which a text successfully supports decision-making for the reader make this purpose much more prominent than the description of textual features in traditional rubrics.

At the same time these questions provide a stronger prompt for writers to take the perspective of their future readers. Asking how well the text supports reader decision-making places the readers’ specific perspective and purpose for reading in the foreground and the specific textual features further in the background. The latter are no longer the characteristics writers should aim for, but become tools to achieve their main purpose, i.e., communication that facilitates their decision-making.

Finally, the changed rubrics require more complex sense making, because it is no longer sufficient to review one’s text with a mental checklist of the elements that should be included. Instead, writers need to translate the desired effects into potential desirable text characteristics from the perspective of their readers before comparing this to their actual text, which means two rounds of sense-making rather than one. Such a two-step process can also be considered to be more complex than a one-step comparison of desirable textual features to those actually present in the text.

This discussion of intersections between the competencies that are central to Education for Sustainability and those required for successful (professional) communication demonstrates that there are significant synergies between them. Furthermore, it emphasises how closely intertwined the different competencies are with each other.

## **6 Conclusions and Future Work**

On a conceptual level this analysis develops an initial, mainly intuitive, sense of synergies between Education for Sustainability and the teaching of professional writing into a coherent argument based on relevant literature. It therefore contributes a stronger theoretical basis for further exploration of the connections between these fields and adds evidence of the potential to deliver the teaching of competencies in engineering education programmes through the ‘holistic’ approach that includes a ‘sharper focus’ on sustainability as set out in AHEP4 (Engineering Council, 2020, 7).

On a practical level, this work provides an example of assessment practice that addresses the requirement of holistically fostering competencies for sustainability and communication among the competencies required of an engineer. This approach is essential due to the tight curriculum in GA programmes and further promotes the importance of team working in the apprentices’ workplaces giving the opportunity to engage with the perspective of co-workers with different areas of expertise. It also contributes to the challenge of enhancing student engagement (Canton & Cowell, 2025) by providing clear incentives to learning new skills in communication and sustainability practice in parallel.

Looking to the future, it is important to include learning and teaching activities that target similar competencies throughout the module and, indeed, programme, to ensure alignment between assessment and teaching (Biggs & Tan, 2007). It is beyond the scope of this paper to outline how this is done in the GA programme, but a detailed evaluation of the impact of these assignments on student learning will need to address this in greater detail. Such an evaluation will also be required to further develop the use of dual assignments in the context of workplace education and to consider their potential in more traditional full-time HE programmes.

In line with further practical work on developing this approach to assessment, closer analysis of the potential intersections between competencies for sustainability and for communication is of interest, both to bolster the conceptual background of practical work and to explore how integrating both at the same time can make best use of existing synergies in a HE landscape with limited resources.

## **References**

- Biggs, John & Tang, Catherine. 2007. *Teaching for Quality Learning at University*. 3rd edition. Maidenhead: McGraw Hill
- Brundiers, K., Barth, M., Cebrián, G. et al. 2021. Key Competencies in Sustainability in Higher Education—toward an Agreed-upon Reference Framework. *Sustainability Science*, **16**: 13–29 <https://doi.org/10.1007/s11625-020-00838-2>
- Canton, U. 2024. Teaching Writing in LD. in Syska, Alicja and Buckley, Carina (eds) *How to be a Learning Developer in Higher Education: Critical Perspectives, Community and Practice*. London: Routledge
- Canton, U. & Cowell, A. 2025. Collaborating with Employers to Shape Assessment Practice on GA and FT modules. *University of Glasgow Learning and Teaching Conference*. 8th April. 2025. <https://www.youtube.com/watch?v=NyuEGiDU84A&list=PLUtE5AlmlvhVBabCbLiGVC-8CyTEHOjRg&index=17>

- Canton, U., Cowell A., Zahn, D, Hogg, J., Gibson, J. & Semple, D. 2023. *Fostering Professional Writing Skills Through Assignments*. [https://rise.articulate.com/share/bQtGuRPFpY-7Bo0LYr\\_g5U9JpmF58k2Q#/](https://rise.articulate.com/share/bQtGuRPFpY-7Bo0LYr_g5U9JpmF58k2Q#/)
- Engineering for One Planet. No date. *Resources*. <https://engineeringforoneplanet.org/resources/>
- Engineering Council. 2020. *The Accreditation of Higher Education Programmes. AHEP 4* <https://www.engc.org.uk/standards-guidance/standards/accreditation-of-higher-education-programmes-ahep/fourth-edition-implemented-by-31-december-2021/>
- Goncalves Quelhas, O.L.,Alves Lima, G.B., Van-Erven Ludolf, N., Jasmim Meiriño, M.J Abreu, C., Anholon, R., Vieira Neto, J. & Goulart Rodrigues, L.S. (2019), "Engineering education and the development of competencies for sustainability", *International Journal of Sustainability in Higher Education*, **20(4)**, pp. 614-629. 10.1108/IJSHE-07-2018-0125SHE-07-2018-0125
- IDG. no date. *Phase 1 Report: Inner Development Goals: Background, method and the IDG framework*. <https://innerdevelopmentgoals.org/about/resources>
- Krauss, R.M. & Fussell, S.R. 1996. Social Psychological Models of Interpersonal Communication. In: Higgins, E.T. and Kruglanski, A. (Eds.), *Social Psychology: Handbook of Basic Principles*. New York: Guilford Press, 655-701
- Office for Students (OfS). No date. *Degree apprenticeships – guide for apprentices*. <https://www.officeforstudents.org.uk/for-students/planning-to-study/degree-apprenticeships-guide-for-apprentices/>
- Pope, J., Annandale, D. & Morrison-Saunders, A. 2004. Conceptualising Sustainability Assessment. *Environmental Impact Assessment Review*, **24(6)**: 595-616 <https://doi.org/10.1016/j.eiar.2004.03.001>.
- Portanova, P., Rifenburg, M. & Rosen, D. 2017. Introduction. In: Ibid (eds.) *Contemporary Perspectives on Cognition and Writing*. Fort Collins and Boulder: WAC Clearinghouse and UP of Colorado, 3-17
- Purvis, B., Mao, Y. & Robinson, D. 2019. Three Pillars of Sustainability: In Search of Conceptual Origins. *Sustainability Science*, **14**: 681–695. <https://doi.org/10.1007/s11625-018-0627-5>
- Rieckman, M 2018. Learning to Transform the World: Key Competencies in Education for Sustainable Development. in Leicht, A., Heiss, J. Byon, W.J. 2018. *Issues and Trends in Education for Sustainable Development*. Unesco. <https://unesdoc.unesco.org/ark:/48223/pf0000261445>
- Royal Academy of Engineering. No date. *Engineering to Meet Sustainable Development Goals*. <https://raeng.org.uk/sdgs>
- Tilley, E., Roach, K. & Truscott, F. No date. *Using Projects for Integrating Sustainability into Engineering Education*. *Engineering Professors Council*. <https://epc.ac.uk/toolkit/using-projects-for-integrating-sustainability-into-engineering-education/>
- Zahn, D., Canton, U, Boyd, V., Hamilton, L., Mamo, J., McKay, J., Proudfoot, L., Telfer, D., Williams, K. & Wilson, C. 2020. The Whole is More than the Sum of its Parts – Assessing Writing Using the Consensual Assessment Technique. *Studies in Higher Education*. Available from: <https://doi.org/10.1080/03075079.2019.1711044>