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Transformative Learning Design for ESD in a Skills-Based Module

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Abstract

The CoDesignS ESD learning design presented in this case study was created by a team of three academics working in collaboration with a team of four, first year undergraduate students at Manchester Metropolitan University (MMU) in the UK. The case study concerns *Professional Geographer,* an existing undergraduate module focused on academic, personal, and professional skills development. Analysis of the new learning design shows that significant changes have been made to the learning activity types employed, and this is now very close to the idealised breakdown. Also, by integrating a number of new learning activities drawing on transformative pedagogies, the specific learning domains are much more evenly balanced in the new learning design. The new learning design was applied to Professional Geographer in 2022-23 and its impact evaluated. Academic members of the *Learning Design and ESD Bootcamp* (ALDESD, 2023) team concluded that the CoDesignS ESD Toolkit (CoDesignS ESD, 2021) provides a tried and tested, robust approach for embedding Education for Sustainable Development (ESD) in curriculum design at MMU. This has resulted in the creation of a suite of Continuing Professional Development (CPD) resources for supporting colleagues to embed ESD. Faculty and Department champions are being identified to help test these resources before integrating them in academic staff development aligned to the University's new (2023) transformational and active learning Education Strategy. These plans advance MMU's Sustainability Strategy (2022-26) targets, in which ESD is a key theme. Team members have benefitted personally and professionally from their participation in the Bootcamp. For example, the academic team are now undertaking research to evaluate large scale application of the Toolkit across the institution; the team academic lead is steering the implementation of transformative, active learning pedagogies at institutional level; and a student team member has secured an industrial placement as an Ethics, Sustainability and Policy Coordinator for a large national retailer.

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case study, education for sustainable development, learning design, skills, geography, higher education

Resumen
El diseño de aprendizaje de CoDesignS ESD presentado en este caso de estudio fue creado por un equipo de tres académicos que trabajaron en colaboración con un equipo de cuatro estudiantes de primer año de pregrado en la Universidad Metropolitana de Manchester (MMU) en el Reino Unido. El estudio de caso se refiere a Geógrafo Profesional, un módulo de pregrado existente enfocado en el desarrollo de habilidades académicas, personales y profesionales. El análisis del nuevo diseño de aprendizaje muestra que se han realizado cambios significativos en los tipos de actividades de aprendizaje empleados, y ahora está muy cerca del desglose idealizado. Además, al integrar una serie de nuevas actividades de aprendizaje basadas en pedagogías transformadoras, los dominios de aprendizaje específicos están mucho más equilibrados en el nuevo diseño de aprendizaje. El nuevo diseño de aprendizaje se aplicó a Geógrafo Profesional en 2022-23 y se evaluó su impacto. Miembros académicos del equipo de *Diseño de Aprendizaje y ESD Bootcamp* (ALDESD, 2023) concluyeron que CoDesignS ESD Toolkit (CoDesignS ESD, 2021) proporciona un enfoque sólido y probado para incorporar la Educación para el Desarrollo Sostenible (EDS) en el diseño curricular en MMU. Esto ha resultado en la creación de un conjunto de recursos de Desarrollo Profesional Continuo (DPC) para ayudar a los colegas a incorporar la EDS. Se están identificando innovadores en la facultad y en el departamento para ayudar a probar estos recursos antes de integrarlos en el desarrollo del personal académico alineado con la nueva estrategia de educación de aprendizaje activo y transformador de la Universidad (2023). Estos planes también avanzan los objetivos de la estrategia de sostenibilidad de MMU (2022-26), en los que la EDS es un tema clave. Los miembros del equipo se han beneficiado personal y profesionalmente de su participación en el Bootcamp. Por ejemplo, el equipo académico ahora está realizando una investigación para evaluar la aplicación a gran escala del Toolkit en toda la institución; el líder académico del equipo está dirigiendo la implementación de pedagogías de aprendizaje activas y transformadoras a nivel institucional; y un miembro del equipo de estudiantes ha asegurado una pasantía industrial como Coordinador de Ética, Sostenibilidad y Políticas para un gran minorista nacional.

Palabras Clave
estudio de caso, educación para el desarrollo sostenible, diseño de aprendizaje, habilidades, geografía, educación superior

Part 1: The Learning Design Context and Outcomes

Context for the Existing Module
The case study concerns an existing undergraduate module (Table 1) equivalent to 150 hours (h) of student effort, including independent study and preparation of assignment work. The module comprises 36h of scheduled in-person classes including 10x weekly 2h workshops, and 11x weekly 1h small group tutorials. In the Bootcamp 2022, the focus was

on re-developing the weekly workshops, totalling 20h of learning design (UNESCO IESALC, 2022). The updated learning designs were partially delivered in September 2022.

Table 1. Module information

Institution	Department of Natural Sciences, Manchester Metropolitan University, UK
Course and Discipline	BSc (Hons) Geography, BSc (Hons) Human Geography, BSc (Hons) Physical Geography
Module name	Professional Geographer
Level (year) of learners	Level 4 (first year undergraduate)
Learning hours / credits	150 learning hours / 15 credits (UK, 7.5 European Credit Transfer System)

The module *Professional Geographer* has been running since 2018 and is delivered by four academics, including authors Nicholson, Vargas and Price. The module is taken by 90-110 first-year undergraduates on our Royal Geographical Society accredited programmes, running for one semester alongside a further 45 credits of learning. The cohort discipline breakdown is typically 50% Geography, 35% Human Geography, and 15% Physical Geography. The module purpose is for academic, personal and professional skills education. Skills are developed 'just-in-time', within a sustainable development conceptual framework that is relevant, engaging, and inspiring. Bridging both natural and social sciences, geography is an ideal discipline for equipping learners to address global sustainability challenges traversing political and economic systems, cultures, landscapes and environments (Bednarz, 2006).

Module learning outcomes

Upon successful completion, students are expected to be able to demonstrate the five module learning outcomes, to:

1. Collaborate in a team to plan, implement, and present a project researching geographical phenomena.
2. Construct a critical academic argument based on evaluation, synthesis, and acknowledgement of appropriate published literature.
3. Collect, analyse, and interpret different types of information using appropriate qualitative and quantitative methods.
4. Communicate and present the outcomes of geographical research using a range of academic and professional styles (e.g. in writing, orally, graphically).
5. Build a professional development portfolio, including consideration of the requirements of an appropriate professional body, and global citizenship.

Module assessment strategy

Students collaborate in small multidisciplinary teams to conduct an enquiry-based learning project, researching a global geographical sustainability challenge of their choice, and exploring links with and implications for the Sustainable Development Goals (SDGs). This work is assessed via a team presentation (20%) and an individual critical review (80%) and the latter includes an online professional development portfolio.

Aspirations for Learning Design

The module was originally conceived to deliver skills education. Framing learning within the context of sustainable development is an aspect that has gradually expanded, and thus the conceptual basis is somewhat fragmented and not well-aligned with module assessment. Without diluting the essential skills teaching, there was a desire to exploit the synergies between skills development and key competencies for the SDGs (Nicholson *et al.*, 2023).

A sustainability pedagogy is distinct from traditional teaching methods. Instead, transformative learning is core to ESD (Leal Filho *et al.,* 2018), and dependent upon teaching methods that require learners to actively engage with their learning (Magkoufopoulou, 2023; Nicholson and Vargas, 2021). The CoDesignS ESD Toolkit (CoDesignS ESD, 2021 - hereafter 'Toolkit') is framed around three pillars; of (1) key competencies for sustainability (Wiek *et al.*, 2011), (2) specific learning objectives (Sipos *et al.*, 2008), and (3) transformative, real-world learning (Brundiers, *et al.,* 2010). In using the Toolkit to embed ESD in *Professional Geographer* there were several objectives:

1. To enhance *Professional Geographer* by:
    a. strengthening skills development alignment with key competencies for sustainability;
    b. making sustainable development concepts more explicit, focusing some learning activities around specific SDGs; and
    c. reviewing the module against revised ESD guidelines (QAA/AdvanceHE, 2021) and the Toolkit.
2. To learn how embedding ESD in a skills-based module might translate to more discipline-focused modules.
3. To assess the effectiveness of embedding ESD (i.e. concepts, competencies, learning domains, teaching methods) at first-year and its applicability to other levels of study.
4. To test the functionality of the Toolkit and its potential application to other disciplines in support of an institution-wide integration of ESD in curricula.

The New Learning Design

The learning design is presented here, following a structure based on key elements of the Toolkit. Our summary 'case' is presented in the Appendix, and a short video overview presentation can be accessed from https://tinyurl.com/ProfessionalGeographerMMU

Key competencies for sustainability

Using the Toolkit planner, analysis of the learning design reveals that the full range of key competencies for sustainability (e.g. Wiek *et al.*, 2011) are included in module learning activities, with stronger representation from ways of being and thinking (Figure 1). Critical thinking, collaboration and problem solving are targeted most frequently, reflecting the team-based enquiry at the module core. It is surprising that strategic competency occurs least frequently given the global challenge at the heart of team projects. Similarly, exposure to concepts around global diversity and diversity among peers in a multi-disciplinary collaboration might suggest that normative competencies would occur more frequently. However, one challenge in identifying the dominant competency for a

particular learning activity is that it may favour over-arching competencies such as critical thinking, over those with a subsidiary role.

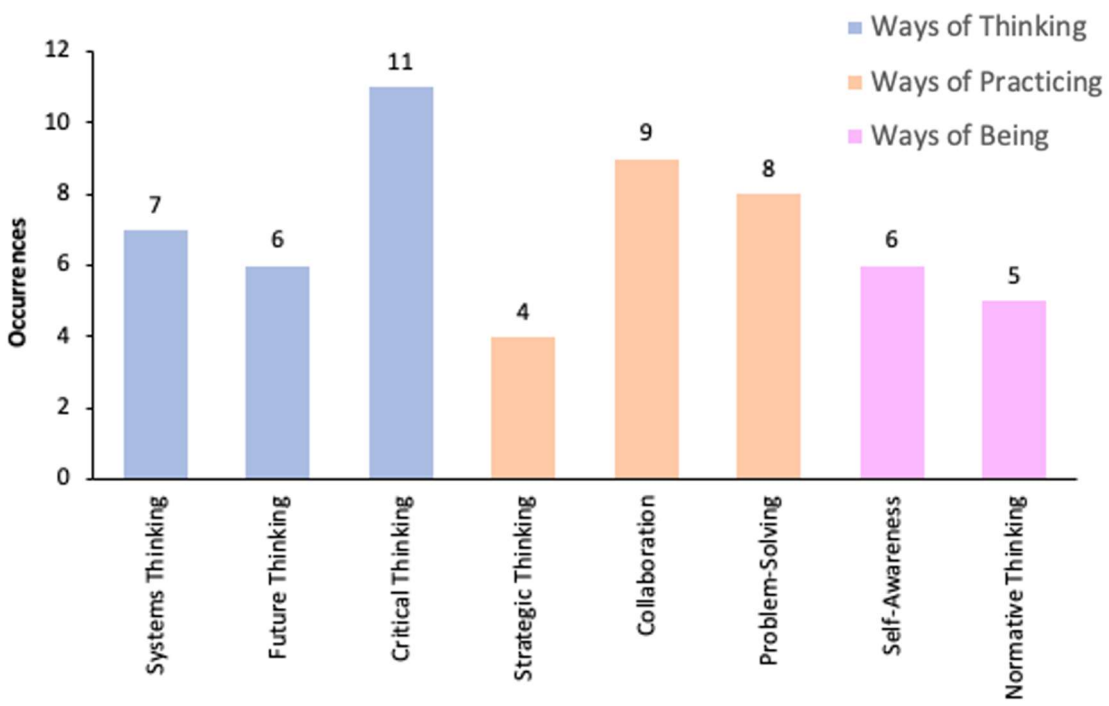


Figure 1. Occurrence of key competencies for sustainability in learning activities

One aim in the new learning design was to increase the representation of ways of practicing (Figure 2) and this was achieved in part, by re-thinking students' production of a PDP (personal development portfolio). In particular, the assessment format was changed from a paper-based to digital portfolio. This incorporates hands-on digital design and the application of multiple tools and techniques, and creativity is encouraged. The e-portfolio is now being embedded in subsequent course levels for continuity, and to promote the use of individual e-portfolios as a personal, portable product for professional use.

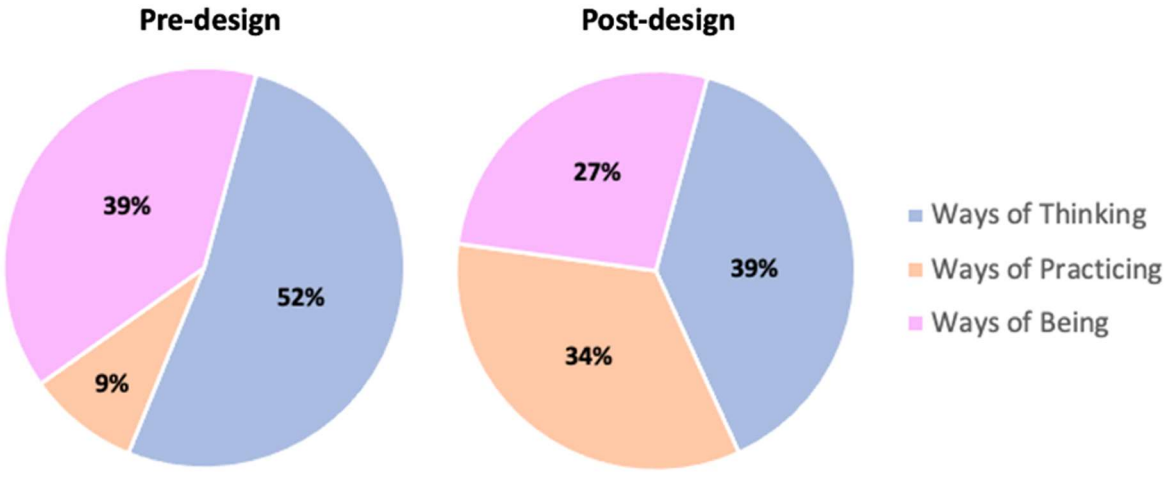


Figure 2. Pre- and post-design key competency types

Specific learning domains and transformative pedagogies

Another objective in the new learning design was to address the domination of socio-emotional activities by increasing learning time in the cognitive and behavioural domains. To achieve a more balanced approach (Figure 3), more emphasis was placed on conceptual content, and several new learning activities that draw on transformative pedagogies were designed and integrated (Table 2).

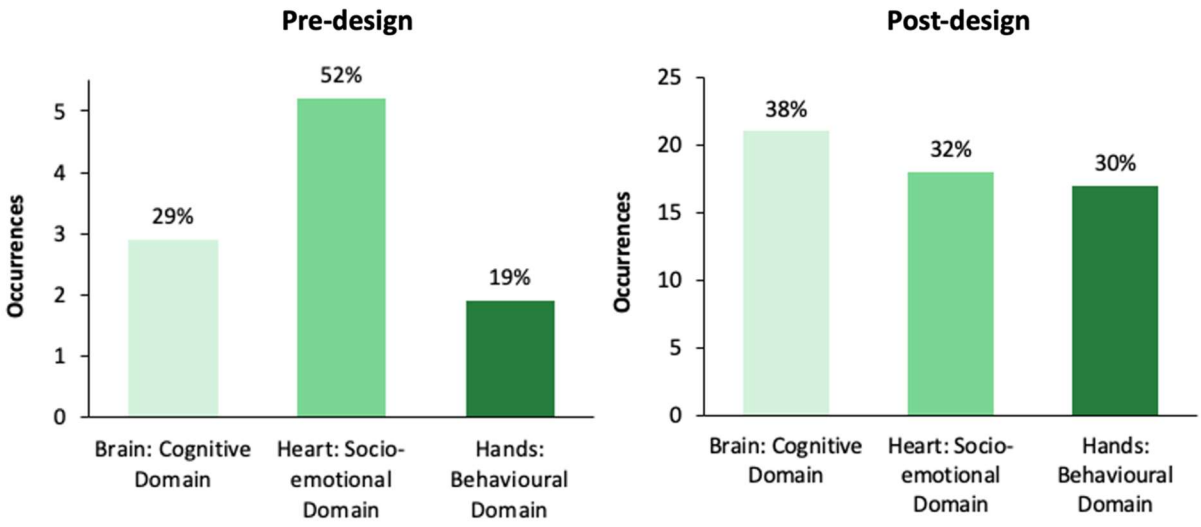
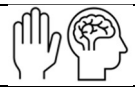


Figure 3. Pre- and post-design Specific Learning Domains

Student team members developed their own learning designs. For example, Khushi applied the learning landscapes concept to develop a sustainability trail learning design; Max adopted the jigsaw classroom concept to design a team-based exploration of SDGs; and Leo integrated an infographic into a systems analysis of a global sustainability challenge. These, and other examples (Table 2), are methods requiring active engagement of learners with their learning, an essential component of transformational pedagogy (Magkoufopoulou, 2023).

Table 2. Examples of new, active learning designs aligned with transformative pedagogies (Ahmad *et al*., 2023) and their dominant Specific Learning Objectives (SLOs).

Transformative learning activity	**Brief description**	**Dominant SLO(s)**
Learning landscape	In teams, devise a campus sustainability trail with 'stations', each providing context, problem solving questions, reflection prompts on individual sustainability behaviours.	
Storytelling	Write a short personal biography, in a storytelling style, of an aspect of life linked to a named SDG or sustainability issue.	
Digital jigsaw learning	Use Google Earth to identify and investigate locations with sustainability challenges. Record and share findings via the 'Map' format in Padlet.com.	

Object-based learning	Use everyday items to stimulate group discussion around sustainability concepts and systems thinking.	
Jigsaw classroom activity	In pairs, investigate an SDG. Share findings with other pairs, sub-groups, and the whole group to identify inter-connected systems.	
Role play debate	Stage a mock debate that demonstrates complex critical arguments linked to sustainability challenges.	
Concept mapping	Depict a team project structure using concept mapping (e.g. key sources, case studies, central arguments, solutions, recommendations).	
World café	Explain the project core concepts and arguments to another team, and receive and give peer feedback.	
Infographic	Create an infographic that summarise the key underpinning information for the team project.	

Sustainable Development Goals

The skills-based nature of the module means that two SDGs are frequently targeted:

- SDG4 (Inclusive and equitable quality education): By its very nature, the module is delivering high quality, inclusive education, aligned with ESD and its linked competencies (e.g. critical thinking).
- SDG8 (Decent work and economic growth): The module maximises the potential for decent work and productive future employment for learners through the focus on personal growth and reflection, professional development, skills education, and career pathways in Geography.

In the introductory part of the module there are a number of learning activities in which either the SDGs are considered as a whole, or a sub-selection of SDGs are explored. For example, to help students develop systems thinking skills, a case study of cobalt mining in the Democratic Republic of Congo is used. An accompanying video raises awareness and prompts discussion of multiple sustainability challenges (e.g. water contamination, child slavery, health issues), and their links to SDGs. To reflect this in the Toolkit planner, SDG17 is adopted to indicate learning activities where more than one, or all, of the SDGs are addressed, and this is reflected in the breakdown of SDGs (Figure 4). Not reflected in this is the selection of one or more SDGs identified as a focus by each project team in the conceptual aspects of their team-based enquiry into a global geographical challenge.

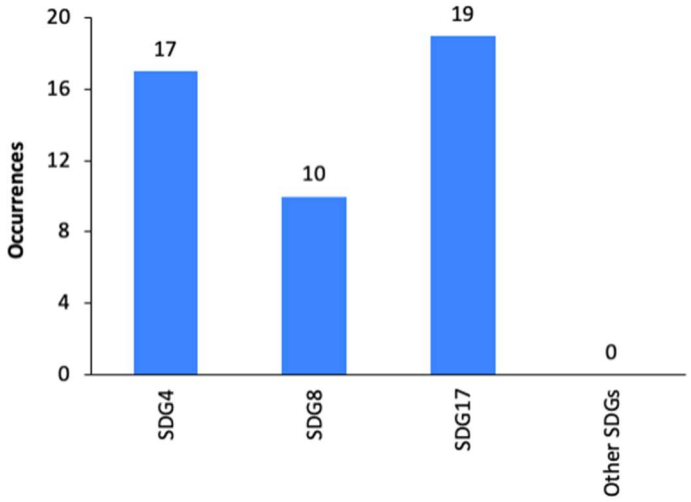


Figure 4. Sustainable Development Goals targeted in whole cohort learning activities
Note: SDG17 indicates activities in which several or all of the SDGs are addressed.

Learning activity types

Prior to the new learning design, learning activities requiring communication and collaboration dominated, reflecting the team-based enquiry at the heart of the module. The teaching team were keen to reduce the amount of assimilative learning in favour of a greater focus on practice and production (Figure 5).

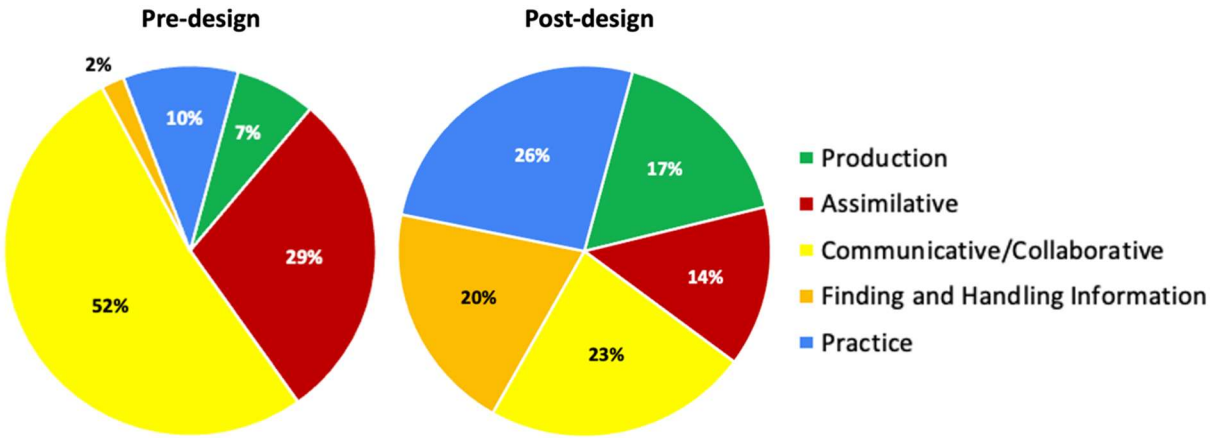


Figure 5. Pre- and post-design learning activity types (Open University, 2021)

Analysis of the revised learning design (Table 3) shows that the significant changes made have produced a breakdown of learning activity types that is now very close to ideal, moving the emphasis from 'know-what' learning towards more effective 'know-how' learning (Garud, 1997).

Table 3. Distribution of learning activity types (Open University, 2021)

	Idealised Breakdown	Professional Geographer
Experiential Learning		
Finding / Handling Information	**70%**	**63%**
Practice		
Production		
Collaborative Learning		
Communication / Collaboration	**20%**	**23%**
Didactic Learning		
Assimilation	**10%**	**14%**

The learning activities and assignment tasks are highly interactive, and draw on a wide range of tools and technology (Figure 6).

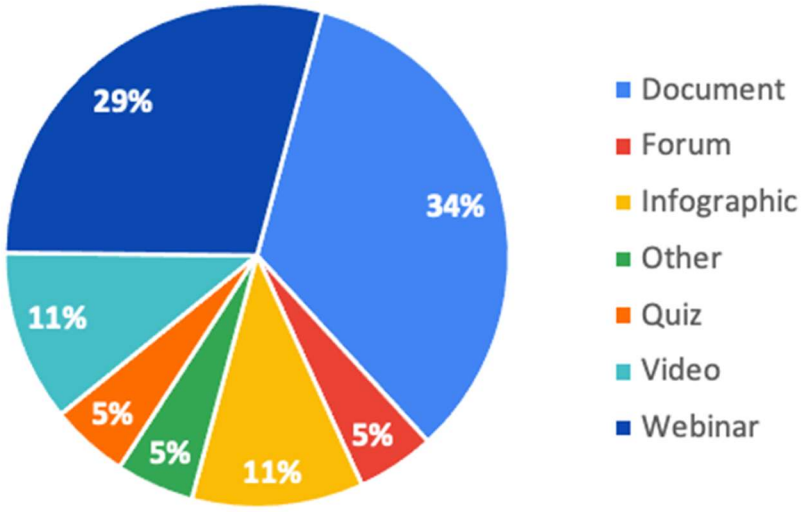


Figure 6. Tools used in our learning activities (see further explanation in Table 5).

Part 2: The Learning Design Process

Design Team Members

The core Bootcamp team comprised three academic colleagues and one first year undergraduate student (Table 4). Three additional first year students were also recruited to form a highly effective extended team. All team members have in-depth experience in at least one aspect of developing, implementing or participating in Professional Geographer, and this familiarity was crucial to the success of learning design. Following completion of the Bootcamp's online modules, we arranged a mixture of in-person and online workshops to brainstorm ideas and develop new learning designs.

Table 4. Composition of our core Bootcamp learning design team

Team Member	Team Role	Institutional Role	Module Role
Dr. Theresa Nicholson	Academic Lead	Reader (Higher Education and Pedagogy)	Module Lead
Valeria Vargas	Lead Educational Developer	Research Associate (ESD)	Workshop Facilitator
Professor Liz Price	Academic	Deputy Pro-Vice Chancellor (Sustainability)	Occasional Workshop Facilitator
Khushi Himatlal	Student Member Core Team	First year undergraduate BSc (Hons) Geography	Module Participant (Sep-Dec 2021)
Leo Campen, Max Hartley, Thomas Hewitt	Student Member Extended Team		

Reflections on the Learning Design

The new learning design has enabled our first objective, to enhance *Professional Geographer*, to be achieved. Sustainable development concepts are now integrated more explicitly and purposefully all key learning activities. The SDGs are explored in greater depth, and there is a specific requirement to link with the SDGs in revised assignment tasks. Links between skills development, ESD and global citizenship are strengthened, and the relevance of key competencies for sustainability is explicitly addressed in learning activities. The learning design has helped meet the second objective, strengthening our conviction that ESD is highly appropriate and effective for skills education. The teaching and assessment strategy now incorporate transformative pedagogies, and the new learning design has improved the balance of learning activity types, key competencies, and specific learning domains. In addition to the Toolkit planner dashboard analyses, several week-by-week analyses were undertaken to explore temporal variations in the balance of learning activities. The findings will be communicated to students to enhance their understanding of the curriculum timeline and develop metacognition. Mapping specific learning objectives over time (Figure 7) for example, indicates increasing activity in the behavioural domain, building on earlier knowledge gained in the cognitive domain.

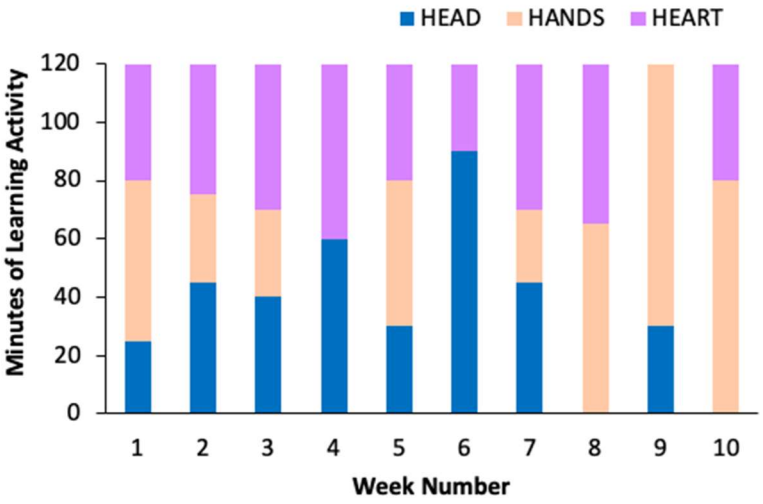


Figure 7. Week-by-week mapping of specific learning domains

Mapping learning activity types over time (Figure 8) indicates a focus on finding and handling information, assimilation and communication earlier in the module, coinciding with the enquiry part of team projects. Towards the end of the module the emphasis switches to production, reflecting the creation of outputs from team projects.

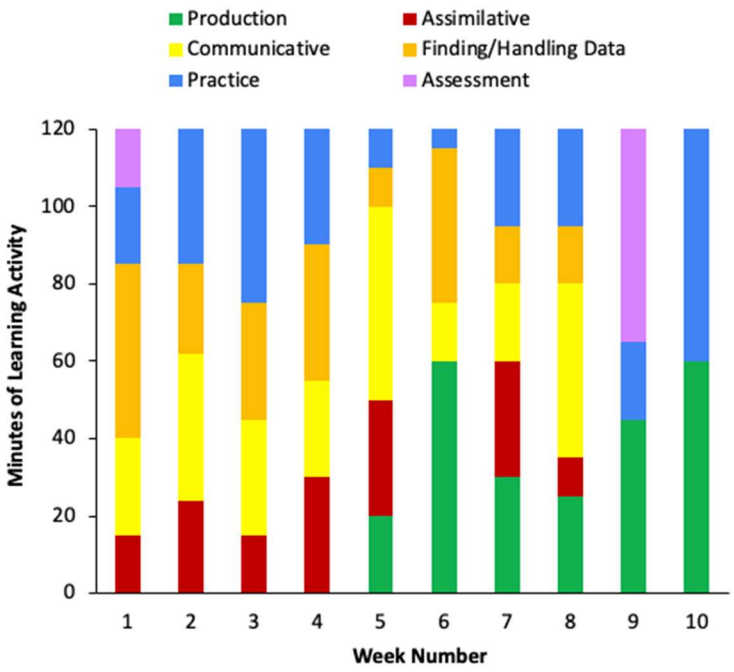


Figure 8. Week-by-week mapping of learning activity types

Mapping key competencies over time (Figure 9) shows a dominance of ways of practicing in the middle and later module phases. Systems thinking is strong throughout. These patterns reflect the team-based enquiry of a global geographical challenge. Peaks in ways of being coincide with learning activities allied to PDP.

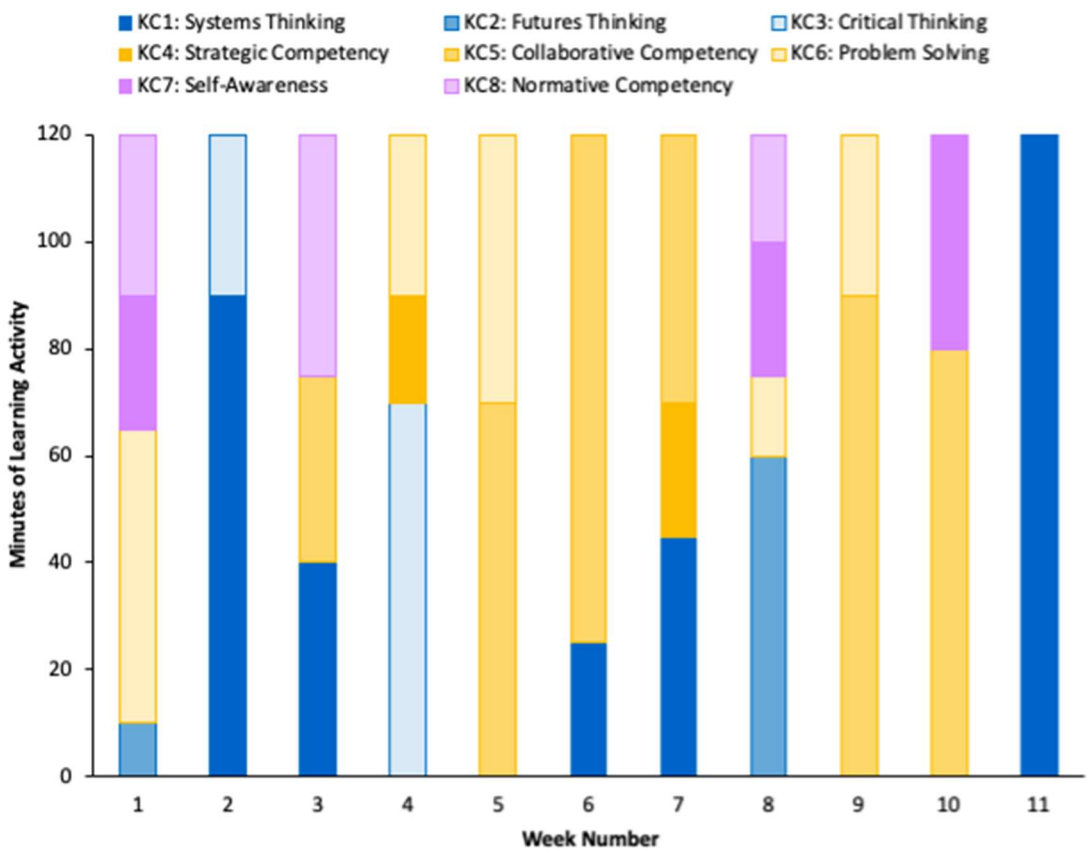


Figure 9. Week-by-week mapping of key competencies for sustainability

Part 3: Next Steps and Future Plans

Future plans

We are a large, modern institution, consistently ranking in the top three for [People and Planet University League (People and Planet, 2023)], with the ambition and passion for continuous improvement in our ESD provision. ESD is currently embedded in some programmes but in our large and complex institution, integration has been inconsistent. We are aware of the challenge, but have a vision:

- to embed ESD effectively and consistently in every programme,
- to do so in partnership with students and staff, and
- to provide cascaded development and training support for academics.

We implemented and evaluated our new learning design for *Professional Geographer* in 2022-23, and this now provides a tried and tested, robust pedagogical approach to curriculum design to support our vision. Academic members of our Bootcamp team are working with our University Teaching Academy to create a suite of resources to support colleagues in embedding ESD. The ALDESD team have also created a bespoke version of the Toolkit planner for our purposes. We are now identifying champions to help test the resources before embarking on staff development at a strategic level. These plans align with our University Sustainability Strategy (Manchester Metropolitan University, 2022), in which ESD is a key theme. We aim to realise two key targets, that:

- 90% students are satisfied they have had opportunities to gain sustainable development skills and knowledge, and

- 100% of our courses include ESD and climate change education.

Reflections on lessons learnt

In addition to future anticipated impact on our institution, working with the Toolkit is having an impact on professional activities for team members. For example, the academic team are now undertaking research to evaluate large scale application of the Toolkit across an institution. The team academic lead is also steering the implementation of transformative, active learning pedagogies at department and institutional level. Our student team members have benefitted personally and professionally. For example, one has secured a 12-month industrial placement with a national retailer as an Ethics, Sustainability and Policy Coordinator. He says "*the knowledge and experience I gained from the Bootcamp was invaluable… largely from my experience in the application of sustainable practices beyond theory.*" Another secured a short-term internship to create resources supporting curriculum decolonisation in our Business School. Our student team members also gained new understanding about the process of curriculum development:

> I learnt just how modules for university are made; essentially how they go from an idea to a tangible module - which was something that I'd never really thought about until the Bootcamp.

And enhanced invaluable academic and personal skills:

> I definitely honed many of my skills such as teamwork, as I was working with people I did not really know before this experience. I also learnt how to be more adaptable and flexible.

All of our student team have completed accredited Carbon Literacy training and we are encouraging them to become facilitators for our institution-wide Carbon Literacy training programme. Working in partnership with an extended student team was a highlight of our Bootcamp experience. It was particularly rewarding to see students' learning designs come to life and play a part in educating others.

Recommendations

For other teams considering learning design for ESD, or embedding ESD at institutional level, we offer some final 'top tips' based on our experience:

1. Working in partnership with an extended student team is a highly rewarding experience, and though it may be tempting to invite more advanced undergraduates or postgraduates, we found first years to be brimming with creativity and enthusiasm.
2. Select an academic team possessing a balance of experience and expertise across curriculum design and ESD.
3. Initially, apply the Toolkit to a manageable learning element; lessons learned from the experience can be up-scaled later as a first step in wider implementation.
4. The Toolkit works very well with skills-focused education, just as it does for discipline-based and content-rich teaching.
5. If the Toolkit doesn't exactly match your context, it can be adapted.

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Appendix

Summary 'Case' for *Professional Geographer* Learning Design

Manchester Metropolitan University

Professional Geographer

For collaborative enquiry and professional development skills

This is a core, 15-credit module delivered to all students on our Geography programmes (including Human and Physical). The overall aim is to equip learners with a range of academic, personal and professional skills and help establish their credentials as early career academics and global citizens.

- Students work in enquiry-based teams to research a global geographical challenge linked to the SDGs.
- Project topics cover a range of themes and vary according to recent global events and current priorities. Examples include lifecycle impacts of products and services, climate change impacts, global or regional implications of projected population growth, and food security.
- The module is supported by practical and skills development workshops, small group tutorials, and team-work study sessions.

KC1 KC2 KC3 KC4 KC5 KC6 KC7 KC8

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How specific learning objectives have been achieved:

At the end of the module students were able to:

Construct a critical academic argument based on evaluation and synthesis of appropriate sources, and recommend solutions to sustainability problems relating to geographical phenomena.

Collaborate in a team, develop awareness of diversity, and reflect on personal responsibility for sustainability challenges. Demonstrate awareness of role as a global citizen.

Build an online professional development portfolio, and communicate (verbally, textually, and graphically) the outcomes of geographical enquiry.

How specific learning objectives were assessed:

Team presentation and infographic: A 15-minute presentation of findings from teams projects to explore a global geographical challenge

Online Professional Development Portfolio: Individual portfolio with evidence of goal-setting, career planning, self-assessment, and written critical review of an aspect of team project

How SDGs have been included:

Learning linked to obtaining quality education. Learners experience and understand the importance of inclusive and equitable quality education and promoting lifelong learning opportunities for all.

Learning activity linking to professional development for the world of work. Learners apply learning to developing and demonstrating own potential for contributing to responsible futures.

Learners are exposed to all of the SDGs and have developed competence in systems thinking relating to sustainability

How have the designed teaching and learning activities been delivered?

Enquiry-based learning: Learners investigate an issue that is of relevance to them personally. Team project topics selected by students are authentic, real-world issues of interest and relevance to them as individuals.

Learning landscapes: Highly relevant to geography, sustainability issues are explored in specific places to develop understanding of concepts.

Object-based learning: Physical objects in the classroom and on a sustainability trail stimulate systems thinking and personal reflection.

Collaborative debate and discussion: Open discussion and debate promote peer learning and develop local and global diversity awareness