

Guide to ESD in practice

Embedding Vertically Integrated Projects for sustainable development for student sustainability competency development

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1. Intended outcomes

By engaging with Vertically Integrated Projects for sustainable development (VIP4SD), students are enabled to:

1. Develop the knowledge, skills, competencies, values and attributes associated with Education for Sustainable Development (ESD) as outlined by the UNESCO ESD competency framework.
2. Gain collaborative and interdisciplinary learning and research experience, and use this experience to understand the interconnectivity of the sustainable development issues outlined by the UN Sustainable Development Goals (SDGs) and the need for an interdisciplinary approach to progressing Agenda 2030.
3. Contribute to research and help to make a practical impact on real-world problems while at university by working alongside their peers and staff from their own and other disciplines.
4. Develop disciplinary and transdisciplinary knowledge, skills and expertise that can equip students to make a positive impact on society and become active global sustainable citizens, and open students up to careers focusing on these global challenges.
5. Understand, evidence and articulate their skills and competency development.

The activity is also designed to enable staff to engage in teaching-led research and achieve impact through teaching.

2. Participants

Academic staff: Vertically Integrated Project (VIP) programmes are made up of multiple projects, which can exist in any discipline. The VIP model enables students to work alongside their peers and academic staff in small teams on long-term research projects for academic credit. The model further allows students to return to the project each semester – in the UK HE model, students might participate in their VIP project for up to three to four academic years and later as postgraduate students. The projects tend to align with the lead academic's research interests, with students acting as research assistants under their supervision. Academics propose the projects, which then go through the usual module approval processes for that department once the internal VIP team has discussed the proposal and made any necessary amendments to bring the project in line with the VIP model. At Strathclyde, VIP is further aligned with sustainable development (hence VIP4SD) as a means of embedding research-based ESD in undergraduate curricula.

Students: students from any discipline or level can take part in VIP4SD if a project is available to them. At Strathclyde, students generally participate from the second year onwards. Team sizes can range from three to 20 students, depending on the discipline and the nature of the project. The student role in smaller teams is therefore essential. Students who have participated for multiple semesters often help to 'onboard' new students and take on more of a leadership and mentorship role in the team.

3. Activity/project

VIP4SD offers undergraduate students the opportunity to collaborate with academics and peers from across disciplines on research-based projects that address the UN SDGs. The key pedagogical approach that unites the projects that make up this cross-institutional programme is Research-based Education for Sustainable Development (RBESD).

Each VIP4SD project is different. For example, one project in the School of Education involves students working with children in local schools to engage them in STEM and build their confidence and knowledge (addressing SDG 4: Quality Education), while a project in Electronic and Electrical Engineering designs and installs solar energy solutions in remote villages in India and The Gambia (SDG 7: Affordable and Clean Energy). The VIP4SD model can therefore be applied to any number of disciplines and complex social problems.

Most VIP4SD projects begin in October at the beginning of the first semester and continue until the end of semester 2. At the end of the second semester, all VIP4SD teams come together to present their work at an annual conference.

Throughout their VIP4SD journey, students are enabled to reflect on their skills and competency development. This is a core element of ESD as a pedagogical approach and represents a transformative approach to higher education. In addition to gaining discipline-specific knowledge, students are enabled to develop the eight key competencies for sustainability outlined by UNESCO:

- + systems thinking
- + anticipatory thinking
- + normative competency
- + strategic competency
- + critical thinking
- + collaboration competency
- + self awareness
- + integrated problem solving

In order to help students evidence, reflect on and articulate their competency development (ie how, where and when they developed these through their VIP4SD journey, and what the output was), the Strathclyde VIP4SD team initiated a pilot with an external edtech provider whose platform supports practice-based learning. The teams involved in the pilot were asked to complete biweekly competency reflections which asked which of the eight key competencies they felt they had developed the most in the preceding fortnight, and which they felt they had the least opportunity to develop (up to three competencies per reflection).

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Students completed these reflections using the STARR framework (Situation, Task, Action, Result, Reflection). Reflecting on the work they had completed in this way acted as a reframing of the traditional logbook task they were previously assigned; this task asks not only what they learned about and achieved, but how they learned and practiced, and why (ie how this work has impacted their skills and the communities and user groups targeted by their projects). At the end of the academic year, students complete a final skills reflection and comment on their improvement from the beginning of the year. This is a further benefit of the VIP model, which enables students to have more time to work on their research and develop their skills.

The competencies students develop vary through projects – for example, some projects might have a stronger focus on systems thinking due to the technical work involved (for example RoProHand, which aims to develop a low-cost robotic prosthetic), while others involve working with the local community and may more immediately develop students' self awareness and anticipatory competencies (for example Apps4Good, where students developed an app to assist the operations of a homelessness charity and were required to undertake a rigorous ethical approval process). There is no expectation or requirement that students emerge having developed all eight competencies, or have developed competencies to the same degree. There is a danger that such an expectation would turn into a tick-box exercise. Instead, our focus is on a more thorough reflection on a smaller range of competencies depending on the project and the student.

4. Assessment or evaluation

VIP4SD assessment is devolved to departments, but an adaptable assessment template is in place. The first semester submissions include:

1. A group statement of intent. This sets out the team's aims for the project over the academic year (not graded).
2. A literature review in the form of a group presentation. This enables students to demonstrate their understanding of the project's wider context (worth 20% of their final grade).

In the second semester students are required to submit:

3. A group poster presentation of their work and accompanying 50-word abstract (c. Week 8) to be presented at the annual ESD@Strath conference (more on this below) in Week 11. This should be accessible to a non-expert audience and outline the project's relevance to sustainable development (worth 20%).
4. A final group report on the team's project work over the course of the academic year. This is the most substantial piece of work students are asked to produce and it is due in late April (worth 30%).
5. A final individual reflection, including a reflection on their development of the eight UNESCO sustainability competencies and their conduct in the project team as a whole (worth 30%). This, perhaps surprisingly, carries the same grade weighting as a final

report, demonstrating the importance VIP4SD places on professional and skills development.

Staff benefits can be evidenced through, for example, staff and students co-authoring publications and conference papers based on shared VIP work. The key focus of the activity is student development.

5. Useful resources

[Short animation of VIP4SD](#)

[VIP4SD website](#)

[VIP International Consortium](#)

[VIP4SD Competency Case Study](#)

[VIP4SD project example – Apps4Good](#)

VIP4SD journal paper:

Strachan, S M, Marshall, S, Murray, P, Coyle, E J and Sonnenberg-Klein, J (2019) 'Using Vertically Integrated Projects to embed research-based education for sustainable development in undergraduate curricula', *International Journal of Sustainability in Higher Education*, 20 (8). Available at: www.emeraldinsight.com/doi/full/10.1108/IJSHE-10-2018-0198

6. Example of practice

One of our newest VIP4SD projects is unique in that it is the first project to be proposed by students (usually they are proposed and led by an academic). Three third-year undergraduates approached the VIP4SD team to create a project that would allow them to undertake credit-bearing work for a charity they were volunteers for, Homeless Project Scotland (HPS). The project involved developing an app that would allow the charity to more effectively, safely and efficiently get aid to rough sleepers on Scotland's streets. HPS's street team works to deliver food, water and clothing to rough sleepers by cycling around cities looking for people in need of aid. The team's app instead proposed to enable users (who would be members of the public) to 'pin' homeless people so that the team could save time and reach more people.

While the project would develop the students' disciplinary knowledge in electrical and electronic engineering and software engineering, the key benefits of the project were those that students would not typically get in their standard curriculum, including writing lengthy ethical approval forms (which had to be resubmitted several times), ensuring GDPR compliance, developing user agreements, and carrying out research with the charity and its volunteers. The project is in line with recently updated QAA Subject Benchmark Statements for Engineering with its focus on EDI, accessibility and sustainability, demonstrating how engineering solutions can transform society, and further enables students to gain an understanding of the ethical implications of their work.

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Students taking part in VIP4SD are part of a wider community of practice – ESD@Strath. This is the banner which all Education for Sustainable Development activity at Strathclyde falls under, and it includes research staff, students, the students' union and staff working to develop ESD in Professional Services. At the end of semester 2, VIP4SD students present their work at the annual ESD@Strath Conference alongside students from other disciplines and initiatives related to ESD. In addition to the aforementioned team poster, student teams can also participate in the VIPer Pit, a Dragon's Den-style competition where students present pitches for project funding, to be taken forward in the next academic year (which helps student retention). A panel of expert judges participate in a live Q&A with the student teams and announce the winner and runners up, with £2,000 being split between the top three teams. The VIPer Pit is one of the most valuable exercises of the VIP4SD experience, helping students to develop their professional and presentation skills.

To increase the impact of the VIPer Pit experience, next academic year we will be collaborating with our entrepreneurship team, Strath Inspire, to develop bespoke guidance for VIP4SD students. This further supports alignment with the new Subject Benchmark Statements.

The VIP4SD programme won the 2019 UK and Ireland Green Gown Award and the 2020 International Green Gown Award for Student Engagement in a Large Institution, as well as the 2020 Association for the Advancement of Sustainability in Higher Education (AASHE) Campus Sustainability Research Award.



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