*Proceeding Paper*

# Vertically Integrated Projects for Sustainable Development: Achieving Transformational Action by Embedding Research-Based ESD in Curricula †

Scott Strachan [1,*], Louise Logan [2] and Stephen Marshall [1,2]

1 Department of Electronic and Electrical Engineering, University of Strathclyde, Glasgow G1 1XQ, UK; stephen.marshall@strath.ac.uk
2 Education Enhancement, University of Strathclyde, Glasgow G1 1XQ, UK; louise.logan@strath.ac.uk
* Correspondence: scott.strachan@strath.ac.uk; Tel.: +44-141-548-2609
† Presented at the ICSD 2021: 9th International Conference on Sustainable Development, Virtual, 20–21 September 2021.

**Abstract:** The University of Strathclyde's Vertically Integrated Projects for Sustainable Development (VIP4SD) programme has grown to become a key vehicle of Research-based Education for Sustainable Development at the institution. The programme enables students from different disciplines and levels of study to work with experienced researchers on diverse projects which address the real-world problems outlined by the Sustainable Development Goals. This paper discusses the challenges encountered in transforming VIP4SD into a mainstream activity, and explores how this has inspired a whole institution approach to embedding ESD throughout Strathclyde's curricula.

**Keywords:** higher education; education for sustainable development; student experience; competencies; graduate employability; graduate skills; research-based education; intercultural learning; vertically integrated projects

## 1. Introduction

The University of Strathclyde's flagship Vertically Integrated Projects for Sustainable Development (VIP4SD) programme is embedded in the formal and informal curriculum and encourages students to work in partnership with experienced researchers and academics, and with their peers from different disciplines and across all year groups to create student-centred research projects focused on the Sustainable Development Goals (SDGs).

The programme is designed to develop the core competencies of Education for Sustainable Development (ESD) through an immersive 'real-world' educational experience that aims to provide a "transformative learning environment" that enables students to engage in "transformative action" through ESD [1], and so not only "prepare our students for the world of work, but to tackle the work of the world" [2]. It does this by embedding ESD in curricula through the use of Research (or Inquiry)-based Education (RBE or IBE).

The paper will explore Strathclyde's experience and the challenges it has encountered in taking the programme from pilot to mainstream and how this has inspired a whole institution approach to embedding ESD more generally in Strathclyde curricula.

## 2. Vertically Integrated Projects and Research-Based Education

Vertically Integrated Projects (VIP) is an innovative style of RBE that came to the University of Strathclyde from the Georgia Institute of Technology (Georgia Tech), where it was originally conceived. The VIP model evolved from a teaching programme initially implemented at Purdue University in 1995—The Engineering Projects in Community Service (EPICS) programme [3], through which students participated in long-term, practical engineering projects focusing on delivering specific outcomes aligned with local community

needs. At Georgia Tech, this model was honed to introduce a more research-intensive dimension, where student teams were built to address unstructured problems associated with broader 'real-world' and applied research areas—though still with an engineering and technology focus [4,5]. The International VIP Consortium, consisting of almost 50 Higher Education Institutions (HEIs) adopting this model for integrating RBE in undergraduate teaching, was formed in 2012, and primarily serves as a community of practice around VIP implementation.

Other approaches, such as UCL's Connected Curriculum [6], have espoused the merits of embedding RBE in and across (or connecting it with) all dimensions of the curriculum; and so too does the VIP model. From the students' perspective, it is the unique vertically integrated dimension of the VIP model that affords the time and space and (to some extent) academic freedom necessary for meaningful and impactful research, as well as the development of personal and professional skills and competencies. From the project or research perspective, this vertically integrated dimension enables projects to plan for, and focus on, long-term, ambitious, and wicked problem areas, safe in the knowledge that a constant stream of student research resource will continually be available. The multi-year group structure of the research teams means that there is always an overlapping period where junior and senior team members work collaboratively to advance the research of those who have come before them and set the future research direction of those who will follow.

### 3. VIP4SD—Research-Based Education for Sustainable Development

The University of Strathclyde implemented VIP as a pilot in 2012, where interested researchers and academics were approached to become 'VIP leads', with support given to build and supervise undergraduate research teams that could enhance existing research projects or explore new research. The model worked well at Strathclyde as it had at other institutions, but scaling and mainstreaming of the programme (beyond 8–10 teams) is a high inertia challenge without the all-important institutional buy-in and support required to scaffold a whole institution approach to implementation.

Key to achieving buy-in was a strategic decision taken by the programme proposers and directors, which was to align two strategic educational objectives of the institution. The first was to cultivate opportunities that could exploit the nexus around teaching and research to develop more collaborative research opportunities for students, which could have co-benefits of providing an authentically experiential learning experience for students while bolstering research groups with this additional resource. The next was to develop experiential learning opportunities for students around sustainable development. By strategically aligning these objectives and using the VIP model as a vehicle for delivering this, the programme was re-imagined as the Vertically Integrated Projects for Sustainable Development programme (VIP4SD) in 2016 (the year the SDGs came into being) – effectively combining RBE with ESD to offer a proven means of embedding Research-Based Education for Sustainable Development (RBESD) in curricula. Other institutions have implemented similar programmes to great effect, such as KTH Stockholm's Global Development Hub, which embeds 'Challenge-Based (or Driven) Education' in their curricula [7].

The inherently multi- and inter-disciplinary nature of the sustainable development agenda necessitated that the formation of the teams be objective-based (or challenge-driven), and therefore presented a prime opportunity to diversify the programme from being predominantly engineering-centric to being more interdisciplinary. This required targeting collaborations around new staff and student cohorts, from different disciplines, departments and faculties. Consequently, the programme at Strathclyde had the cause and challenge-driven justification to add this cross faculty (horizontal) dimension to the already vertically integrated model to meet the interdisciplinary needs of the SDGs.

Examples of VIP4SD projects are:

- *Can Democracy Deliver* (SDG 16)—employs a range of student disciplines to examine the linkages between the quality of democracy, citizenship, infrastructure, service delivery, and quality of life in developing countries;
- *Building Pandemic Resilience* (SDG 3, 9, 11)—aims to develop methods of using Indoor Environmental Quality (IEQ) metrics to rapidly inform best practice for managing and designing buildings to enhance the health and wellbeing of occupants, initially by informing short and long-term COVID-19 disaster responses;
- *Community Engagement and Glasgow Children's University* (SDG 4, 10)—aims to develop a web-based tool for the collation, co-ordination and promotion of credit-bearing (and outreach) activities that can be drawn together from learning activities across the University (and potentially beyond) to service the Glasgow Children's University [8].

ESD has been criticized for its vagueness, but UNESCO's framework for the implementation of "ESD for 2030" acknowledges that while this may be the case it can be addressed more concretely when ESD is linked with the SDGs. It states that "the 17 SDGs, which encompass the issues related to development and sustainability in a single framework, offer to the global community a renewed window of opportunity to reinforce this fundamental function of ESD" [9]. Therefore, while the projects are structured along these vertically and horizontally integrated lines, the programme's research project portfolio uses the SDG framework to provide a clear identity and purpose for individual projects, while retaining the sense of interconnectedness that exists in the relationships between the goals and VIP4SD projects.

The moral imperative attached to Agenda 2030 is the overarching global objective unifying all VIP4SD research teams; giving a common sense of purpose across the entire programme; raising the stakes of teaching and learning and working to motivate and inspire students to engage in a deeper level of inquiry and learning through RBE.

This alignment of key strategic objectives including interdisciplinary RBE and ESD (together forming RBESD), the narrative of Strathclyde students contributing positively and collectively to Agenda 2030 as an integral part of their studies, and its resonance with the institution's socially progressive traditions and ethos of being "the place of useful learning," created a potent and compelling narrative which served the programme well when securing the institutional buy-in required to mainstream VIP4SD and subsequently embed and mainstream ESD more generally.

## 4. Implementing VIP4SD in Higher Education—The Strathclyde Perspective

Continuing the progress made during the Decade for Education for Sustainable Development, the Global Action Programme for ESD (GAP) sought to "integrate the principles of sustainability into educational strategies and action plans" at national, local and institutional levels [9]. In 2020 a new UNESCO implementation framework for ESD is available along with other guidance documents, offering practical 'how to' support, tools and guidance that will allow institutions to more easily adapt and integrate ESD for their institutional setting and context.

A reflection on the approach to mainstreaming and embedding VIP4SD (and RBESD) in Strathclyde curricula recognizes a close alignment with the UNESCO approach [10], with much of the QAA/AdvanceHE ESD guidance also resonating [11]. The broad action plan followed to mainstream and embed VIP4SD in Strathclyde curricula involved:

1. SDG Mapping;
2. Raising awareness, gathering buy-in, building activism and capacity;
3. Identifying and addressing barriers and challenges for VIP4SD;
4. Monitoring and evaluation of VIP4SD programme;
5. Building partnerships and share knowledge/practice.

### 4.1. Mapping SDGs to Existing VIP Projects

Following the decision to realign the existing VIP programme with the SDG framework, it was necessary conduct an SDG mapping exercise across existing projects. Given how comprehensive the developed SDG framework is in terms of addressing the principal environmental and socio-economic problems facing humanity, it proved extremely easy to map existing VIP projects onto one or more SDG targets. Reassuringly, though perhaps not surprisingly, there was no requirement to 'shoehorn' SDGs into VIP projects (or vice-versa). However, it was key to ensure that the VIP leads had already bought into this realignment to avoid undermining their position as project initiator and inventor; to respect their continuing role as project lead and director; and to ensure that the SDG context added gravitas and was viewed positively as a different lens through which students would meaningfully engage.

### 4.2. Raising Awareness, Gathering Buy-In, Building Activism and Capacity for VIP4SD

As mentioned previously, creating a powerful and engaging narrative for the programme was a key component to securing buy-in. However, it was equally important to demonstrate its practical implementation and scalability. Perhaps what made the case most compelling was the staff, student and stakeholder testimonies evidencing (albeit anecdotally) the impact and efficacy of the pilot programme. Some level of external peer review and recognition through publications, blogs, and articles, as well as national and global awards [12,13], was also key in raising the profile and awareness of the programme and securing the confidence and institutional buy-in required.

Ensuring capacity for staff was critical to building a culture of confidence amongst staff to deliver new programmes involving unfamiliar and disruptive approaches such as VIP4SD. To achieve this we needed to provide support that reinforced the practices and processes that underpin the successful supervision of VIP4SD projects, as well as effective programme delivery. To aid this, a new VIP4SD coordinator role was created with a staff appointment made to this position, and an appropriate staff induction was developed with a Strathclyde community of practice established through regular VIP4SD lead meetings designed to share good practice and lessons learned across the programme.

Project capacity is also an ongoing challenge, but one that is expected to ease further once a critical mass is achieved and more momentum gained. The catalyst to attracting leads and projects, which supports sustainable programme growth, is incentive provision. Specifically, this entails the recognition of VIP4SD roles in career development pathways and the provision of project funding—as discussed below.

### 4.3. Identify and Address Barriers and Challenges for VIP4SD

The main challenges in the implementation of the VIP4SD programme exist around:

- Institutional promotion and acceptance (buy-in): This has been discussed in Section 3, but a key recommendation is the development of a 'small-scale' proof of concept pilot to enable the building of a case, supported by staff and student testimonies, for programme scale-up and mainstreaming;
- Academic regulations, curriculum changes and credit structures: 'Container classes' (i.e., project-based classes with equivalent learning outcomes), electives and also extra credit options were used to create vertically integrated pathways through ascending years of degree curricula;
- Project resourcing and student engagement: Staff provided modest seed funding for projects and brokerage events where project leads pitch to students. Students apply for team selection via a specially designed VIP4SD application portal, which matches project requirements with year groups and degree disciplines exhibiting vertically integrated pathways. It is important to recognize here that the approach to mainstreaming has been challenge- and project-driven, where pathways are developed in accordance with 'live' projects. In addition, staff participation in the VIP4SD programme must be fully acknowledged in workload models, development reviews

and promotion cases. In terms of promotion amongst students, beyond 'word of mouth' building evidence to promote the positive impact on the student learning experience requiring monitoring and evaluation of the programme (discussed in Section 4.4). Another resource requirement and incentive for staff uptake is the provision of project funding. Strathclyde has worked with its Alumni and Development Department to attract successful donor funding. The obtained funds are then dispersed through VIP4SD seed funding calls (e.g., often aligned with themes such as COVID-19 response, COP26 legacy, etc.), internship funding and "VIPer Pit" prizes, where students pitch for project research funding to a team of stakeholders from private, public, and third sectors;

- Degree accreditation requirements: Important to advocate for extraneous change to degree accreditation criteria involving the explicit inclusion of elements of RBE and ESD in order to affect change inside;
- Assessment and supervision: While there is flexibility for different leads to develop different assessment methods and criteria, there is a desire to move towards a consistent (though not completely rigid) approach involving methods of group assessment such as project reports, conference poster and Pecha Kucha presentations.

### 4.4. Monitoring and Evaluation of VIP4SD Programme and Development of ESD Competencies

Monitoring and critically reflecting on progress is clearly important to ensure the programme is scaling universally and consistently across the institution, and that is having the intended impact on students and target communities and stakeholders. At Strathclyde we are in the process of capturing and analysing feedback primarily through staff and student surveys and focus groups. One student survey we have developed is intended to allow evaluation of the programme's efficacy with respect to ESD competency development in particular.

The OECD and WEF are among many to have defined what they consider to be the employment and career skills of the future [14–16]. The OECD defines skills as part of 'a holistic concept of competency, involving the mobilisation of knowledge, skills, attitudes and values to meet complex demands' [14]. The complex demands that business and industry will face in the future will therefore require employees and graduates competent in helping employers meet these, which is being increasingly recognized in ESG strategies. Whilst variations exist in how these competencies are defined and prioritized, there are overlaps [17]. Wiek et al. presented an interlinking, ESD competency framework consisting of five key competencies identified as Systems Thinking, Anticipatory, Strategic Thinking, Interpersonal and Normative, and emphasized the need to enable students to not only develop these individual competencies, but to 'combine these competencies in a meaningful and effective way' [18]. However, doing so in ways that competency development can be evaluated and evidenced effectively remains challenging.

Building on the work of Weik et al., UNESCO ESD competencies represent a broad global consensus on the core ESD competencies [19]. UNESCO define these as a set of related knowledge, skills and abilities that result in essential behaviours. They focus on a set of eight competencies building on those identified by Wiek et al. The QAA and Advance HE ESD Guidance mentioned previously is based on and framed around these UNESCO competencies, categorizing them as ways of thinking, being and practicing. These categories align with Orr's initial approach to what was regarded as ecoliteracy education and built upon by others to achieve transformative sustainability learning by engaging the head (cognitive), heart (affective) and hands (psychomotor) domains [20].

It is these robust and well-acknowledged ESD competency frameworks subscribed to by UNESCO that Strathclyde has chosen to use as the basis of measuring student skills development and its programme efficacy, which is work still in progress. The so-called "articulation of skills gap" addresses the fact that despite possessing key competencies and skills, VIP4SD students may be unable to identify and articulate these effectively to themselves or others (for example, employers). To address this, work is ongoing with a third

party enterprise to develop an experiential learning support platform that will prompt and enable students to record, understand, track and articulate their own competency development derived directly from their participation in VIP4SD – effectively the What, When, Where and How they developed these competencies through their VIP4SD journey. This will culminate in the compilation of a portfolio of tangible evidence demonstrating their competency development accompanied by corresponding STARS reflections (Situation or Task, Action, Result and Self-reflection). This will also provide a clearer insight into the efficacy of the programme across the VIP4SD cohort, moving beyond a reliance on anecdotal evidence and towards a more robust framework for capturing and evidencing student competency development as part of their transformational VIP4SD learning journey and the effectiveness of the broader programme.

*4.5. Build Partnerships and Share Knowledge/Practice*

In addition to the internal community of practice mentioned previously (Section 4.2), external partnerships through the International VIP Consortium has also proven to be a very useful knowledge-base, where institutions, despite their geographical diversity, still experience many of the same challenges (some outlined above), and can therefore share common solutions. The consortium is currently developing a VIP handbook for institutions that will formalize this support for start-up and established VIP programmes.

Strathclyde has also been keen to share its own VIP innovation – its alignment with ESD being its principal innovation – both with partners inside the consortium and with other, non-VIP institutions. Of these institutions, there are some that are already operating similar programmes (for example, KTH Stockholm's Global Development Hub); some which have expertise in other areas that could further enhance the VIP4SD model and its impact on the student experience (for example, COIL and VEIL, discussed in Section 6); and some institutions that are just beginning their journey to embed RBE and ESD into their curricula. In addition to institutional and staff partnerships, more can be done to enhance opportunities for greater partnership between students, particularly cross-institutional, international student research partnerships through the adoption and integration of COIL (see Section 6).

## 5. From VIP4SD to ESD@Strath

The demonstrable practicality of embedding RBESD through the VIP4SD programme was a key factor in achieving institutional buy-in to "[place] Education for Sustainable Development (ESD), aligned with the UN Sustainable Development Goals, at the heart of its curricula" [21]. It is recognized at Strathclyde that if education is to be oriented toward sustainability, then this will require a whole-institution approach involving changes to processes and practices as required, and involving all faculties, departments, professional services, operations, relevant groups and our Student Union.

New programmes and modules with a dedicated focus on sustainable development (like the VIP4SD programme) should be created and promoted; but to ensure ESD is meaningfully "placed at the heart of our curricula" and sustainable development made relevant to all of our students requires ESD not being treated as a thematic topic. ESD must be woven into the fabric of the formal, informal and subliminal curricula. Only then can the principles and practices of sustainable development be fully integrated into all aspects of education and learning—and ESD embedded within all courses (existing and new) to ensure a comprehensive and sustainable institutional contribution to SDG 4.7.

Strides are being made in this direction at Strathclyde with the launch of its new Centre for Sustainable Development (CfSD) which is coordinating a whole institution approach to Strathclyde's contribution to the progression of the SDGs. This will bring a coherence to the University's own global, socially progressive vision, and focus its long-standing research and education work on sustainable development into a single strategic approach. The "Education and Activism" thread of the CfSD is now actively implementing its ESD@Strath action plan, following a very similar approach to that followed and outlined above, but now

with a more holistic, expansive and all-encompassing remit and approach to embedding ESD more generally.

## 6. Future Opportunities for VIP4SD

As the VIP4SD programme continues to expand across (and potentially beyond) the University of Strathclyde, there are plans to further enhance the programme by adding a new global and intercultural dimension to the existing vertical (inter-year) and horizontal (interdisciplinary) dimensions already discussed. Our diversity in an increasingly interconnected world is a key asset, and global collaboration in every sense will be key to harnessing this and achieving climate change adaptation and mitigation in a way that is socially and economically progressive. Ensuring innovators, technologists, business leaders and citizens of the future exhibit the global competency that is so critical to achieving worldwide sustainable development.

Education for global competence builds on the ideas of different models of global education, such as intercultural education, global citizenship education and education for democratic citizenship. Global competence is now (from 2018) an integral part of the OECD's PISA framework. It defines global competence as "the capacity to examine local, global and intercultural issues, to understand and appreciate the perspectives and world views of others, to engage in open, appropriate and effective interactions with people from different cultures, and to act for collective well-being and sustainable development" [22]. This global competency must be embedded, enabled and nurtured within ESD; particularly in experiential ESD offerings such as VIP4SD, as this can lead to a genuinely transformational learning experience and will result in more globally and culturally rounded graduates. However, relying solely on international student mobility (ISM) to develop this global competency at best prevents this from being widely accessible and at worst can be considered non-inclusive and elitist (as clearly not all students have the financial or social capacity, and therefore equal opportunity, to participate). Furthermore, given how selective this can be, relying solely on ISM as a vehicle for intercultural engagement is not only arguably unethical, but it is also both uneconomical and un-scalable if it is intended for wider deployment as an integral component of ESD.

The global network that is the International VIP Consortium represents fertile ground for interdisciplinary, international and intercultural research collaboration between undergraduate students working on wicked global research challenges. Here, students' intercultural competency is being developed to improve engagement with their international research partners (from other VIP sites – the Building Pandemic Resilience project outlined above is a partnership between Strathclyde and Purdue Universities), as well as the stakeholders and communities on which their research centres. Strathclyde academics experienced in facilitating 'Global Classrooms' and Purdue's Center for Intercultural Learning, Mentorship, Assessment and Research (CILMAR), which makes of use of tools such as Intercultural Development Inventory (IDI) to assess and evaluate IC and the Intercultural Development Hub (IDH) to share intercultural learning activities, assessments, and publications, will bring their experience of VEIL (Virtual Experiential Intercultural Learning) to provide scaffolding and training for both staff and students engaged with COIL [23,24]. Meanwhile, the VIP Consortium is discussing the possibilities around the practical support it can offer by way of developing 'matchmaking' sessions and tools to facilitate more coordinated and integrated COIL and VEIL activity across the VIP consortium.

## 7. Conclusions

The 'idea of the University' has shifted over time, where the contemporary model of a research-intensive, state and/or entrepreneurial University has evolved and morphed into a 'being' with traits remaining and inherited from antecedent models [25]. There is some debate over whether the 'idea of the University' is to allow for the pursuit of knowledge 'for its own sake', or to 'enable economic and societal progress through a developmental model involving wider community and stakeholder engagement' [26]. Or, perhaps it is both of

these things and more, in line with the so-called 'multiversity', involving an interconnected multiverse of stakeholders involving HEIs, governments, businesses, industries, NGOs, etc. [27]. Putting such debates aside, what is clear is that all of these key actors will be required to work collectively to achieve global sustainability, and—critically—it is incumbent upon HEIs to generate the sustainability-competent graduates these actors need.

To achieve this 21st Century graduate for our times, this paper promotes the need to embrace and reimagine the central Humboldtian principle of the 'union of teaching and research', but with a clear focus on wicked global challenges—the classical view of universities is of 'a community of scholars and students engaged in a common challenge' [27]. This paper presents the VIP4SD model as a practical and workable means of embedding interdisciplinary RBESD in HE, where students can work partnership with each other across year groups, disciplines, departments, faculties, institutions and borders—and with academics—to contribute meaningfully to the universal challenge of advancing sustainable development.

## References

1. UNESCO. Framework for the Implementation of Education for Sustainable Development Beyond 2019. Available online: https://unesdoc.unesco.org/ark:/48223/pf0000370215.locale=en (accessed on 29 July 2021).
2. Porritt, J. Universities Must Lead the Way on the Sustainability Agenda. *The Guardian*. Available online: https://www.theguardian.com/higher-education-network/blog/2012/feb/16/universities-lead-sustainability-agenda-porritt (accessed on 2 December 2021).
3. Coyle, E.J.; Allebach, J.; Krueger, J. 2006–2565: The Vertically Integrated Projects (VIP) Program in ECE at Purdue: Fully Integrated Undergraduate Education and Graduate Research. In Proceedings of the 2006 ASEE Annual Conference and Exposition, Chicago, IL, USA, 18 June 2006. Available online: https://peer.asee.org/the-vertically-integrated-projects-vip-program-in-ece-at-purdue-fully-integrating-undergraduate-education-and-graduate-research (accessed on 2 December 2021).
4. Alber, R.T.; Coyle, E.J.; Kim, H.T.; Marshall, S.; Pardo, M.; Sonnenberg-Klein, J.; Spencer, W. Vertically Integrated Projects Programs at International Institutions: Multidisciplinary Projects with Homes in Any Discipline. In *2017 ASEE International Forum*; Columbus, OH, USA, 28 June 2017. Available online: https://peer.asee.org/vertically-integrated-projects-vip-programs-at-international-institutions-multidisciplinary-projects-with-homes-in-any-discipline (accessed on 2 December 2021).
5. Melkers, J.E.; Kiopa, A.; Abler, R.T.; Coyle, E.J.; Ernst, J.M.; Krogmeier, J.V.; Johnson, A. The Social Web of Engineering Education: Knowledge Exchange in Integrated Project Teams. In Proceedings of the 2012 ASEE Annual Conference and Exposition, San Antonio, TX, USA, 10 June 2012; Available online: https://peer.asee.org/the-social-web-of-engineering-education-knowledge-exchange-in-integrated-project-teams (accessed on 2 December 2021).
6. Fung, D. *A Connected Curriculum for Higher Education*; UCLPress: London, UK, 2017.
7. Wyss, R.; Kissaka, M.; Shayo, E.; Mwase, C. Mutual Innovation Capacity Building through Challenge Driven Education for Sustainable Development in an International Framework. In Proceedings of the 12th International Conference of Education, Research and Innovation, Seville, Spain, 11 November 2019; Available online: https://www.researchgate.net/publication/338106331_MUTUAL_INNOVATION_CAPACITY_BUILDING_THROUGH_CHALLENGE_DRIVEN_EDUCATION_FOR_SUSTAINABLE_DEVELOPMENT_IN_AN_INTERNATIONAL_FRAMEWORK (accessed on 2 December 2021).
8. Vertically Integrated Projects for Sustainable Development. Available online: https://www.strath.ac.uk/studywithus/verticallyintegratedprojectsforsustainabledevelopment/ (accessed on 2 December 2021).
9. UNESCO. Global Action Programme. Available online: https://en.unesco.org/globalactionprogrammeoneducation (accessed on 29 July 2021).

10. UNESCO. Getting Started with the SDGs at Universities. Available online: https://ap-unsdsn.org/wp-content/uploads/University-SDG-Guide_web.pdf (accessed on 29 July 2021).
11. QAA/AdvanceHE. Education for Sustainable Development Guidance. Available online: https://www.qaa.ac.uk/quality-code/education-for-sustainable-development (accessed on 29 July 2021).
12. Green Gown Awards 2019—University of Strathclyde—Winner. Available online: https://www.sustainabilityexchange.ac.uk/green_gown_awards_2019_university_of_strathclyd (accessed on 29 July 2021).
13. 2020 AASHE Sustainability Awards. Available online: https://pureportal.strath.ac.uk/en/prizes/2020-aashe-sustainability-awards-campus-sustainability-research-a (accessed on 29 July 2021).
14. OECD. Skills Matter. Available online: https://www.oecd-library.org/content/publication/9789264258051-en (accessed on 29 July 2021).
15. World Economic Forum. The Future of Jobs: Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution. *Global Challenge Insight Report*. Available online: https://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf (accessed on 2 December 2021).
16. World Economic Forum. The Future of Jobs Report 2020. Available online: https://www.weforum.org/reports/the-future-of-jobs-report-2020 (accessed on 3 December 2021).
17. Voogt, J.; Roblin, N.P. A comparative analysis of international frameworks for 21st century competences: Implications for national curriculum policies. *J. Curric. Stud.* **2012**, *44*, 299–321. [CrossRef]
18. Wiek, A.; Withycombe, L.; Redman, C.L. Key competencies in sustainability: A reference framework for academic program development. *Sustain. Sci.* **2011**, *6*, 203–218. [CrossRef]
19. UNESCO. Education for Sustainable Development Goals: Learning Objectives. Available online: https://unesdoc.unesco.org/ark:/48223/pf0000247444 (accessed on 29 July 2021).
20. Orr, D. *Ecological Literacy: Education for a Postmodern World*; State University of New York Press: New York, NY, USA, 1992.
21. OECD. PISA 2018 Global Competence. Available online: https://www.oecd.org/pisa/innovation/global-competence/ (accessed on 29 July 2021).
22. Simmons, E.L.; D'Angelo, D.C.; Cataline, J. Global Classrooms: Creating International Collaborative Initiatives. In *Unplugging the Classroom: Teaching with Technologies to Promote Students' Lifelong Learning*; Pixy Ferris, S., Wilder, H., Eds.; Chandos Publishing: Cambridge, UK, 2017; pp. 187–213.
23. Intercultural Development Inventory. The Roadmap to Intercultural Competency Using the IDI. Available online: https://idiinventory.com/ (accessed on 29 July 2021).
24. Newman, J.H. *The Idea of a University*; Yale University Press: New Haven, CT, USA, 1996.
25. McCowan, T. Universities and the post-2015 development agenda: An analytical framework. *High. Educ.* **2016**, *72*, 505–523. [CrossRef]
26. Kerr, C. *The Uses of the University*, 5th ed.; Harvard University Press: Cambridge, MA, USA, 2001.
27. Anderson, R. The 'Idea of a University' Today. Available online: https://www.historyandpolicy.org/policy-papers/papers/the-idea-of-a-university-today (accessed on 29 July 2021).