

From StrathCEKO to StrathCAN – Building a Community of Climate Education Ambassadors from the Bottom Up in a Higher Education Institution

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1. Introduction

This paper offers a reflective account of the University of Strathclyde's activity and experience of implementing its first Strathclyde Climate Education Kick-Off (or StrathCEKO) as the catalyst for the emergence of a bottom-up movement and community involving staff and students focused on scaling up curricular and extra-curricular Climate Education activities across the institution – and beyond.

StrathCEKO initially focused on two separate, but highly complementary, 'off-the-shelf' workshop offerings, developed by different NGOs/think-tanks. Together, they encouraged participants to take a collaborative, peer-to-peer, systems thinking approach to understanding the cause and effects of climate change (i.e. the problem) and discuss and evaluate the range of mitigations and implementation challenges (i.e. the solutions) required to "keep 1.5 alive" and secure a sustainable future for all. Using these well-developed, tried and tested, scientifically and academically robust workshop offerings makes sense, for resource constrained Higher Education Institutions (HEIs). Despite having abundant research expertise, institutions and academics are often bereft of the time required to craft educational workshop 'products' to the same production standards and as quickly as NGOs, with a specific focus and purpose to do so. Additionally, these organizations offer constant and routine refinements and enhancements to these offerings. The role of HEIs then becomes one of consumer, moderator and implementer of these educational 'products'. However, there also remains scope for academics to adapt these to their specific educational and/or disciplinary context.

Following the original StrathCEKO, there was a realisation that despite the scalable peer-to-peer, train-the-trainer (or facilitator) model that made this Climate Education 'tool' so attractive to resource limited institutions, it still required a core community. A community with a clear identity and purpose, to take institutional ownership of these workshops in order to effectively roll them out and scale them up. Furthermore, it was understood that 'membership' of this community should be open to **all** staff and students. The main responsibility of 'the community' with regards to these workshops should be for members to take *individual* responsibility to identify opportunities within their classes, departments, networks, even local communities, where these workshops could be organised and run – as well as *collective* responsibility to support each other in the co-facilitation and delivery of these workshops, as and when required.

In addition to this practical, logistical, delivery role, it became apparent that there was a need, and also an opportunity, for this fledgling Climate Education community to fulfil a more co-creative role. This would see staff and students come together to use other off-the-shelf Climate Education offerings developed by third parties, and develop more climate (and sustainability-focused) educational workshops and activities that could be used effectively (and expeditiously, given we are all at the centre of a climate emergency), by staff and students to scale-up climate education inside and outside the University of Strathclyde.

This community now has an identity, as well as a clear remit – the Strathclyde Climate Ambassadors Network (StrathCAN) with a purpose to scale-up climate education inside and outside the University of Strathclyde as a co-creative and collaborative community of staff AND students. This paper will present the journey so far, including the challenges, curriculum successes, activities under construction, as well as its strategic vision for the future.

2. A Global Context: Climate Education, Systems Thinking and other UNESCO Competencies

Albert Einstein said that *“without changing our pattern of thought, we will not be able to solve the problems we created with our current patterns of thought.”* Put more simply this tells us that we cannot solve our current problems with the same thinking we used to create them. In the context of climate change and sustainability, these words emphasise the role of education and educators in changing the *‘way we think’* about the world around us and *“equipping learners with the skills, attributes and competencies required to safeguard our [highly interconnected] social, environmental and economic wellbeing”* as set out in UNESCO’s definition of Education for Sustainable Development (ESD). Understanding such complex global issues requires a new *‘way of thinking’* (and also ways of practicing and being), that consider the many interactions that occur within a *system* and across ecological, social and economic *systems*. Furthermore, research has shown that people who score higher on *‘systems thinking’* are consistently more likely to be better informed and hence value issues like climate change as personally important and take more effective action on them [Ballew 2019]¹. Having a better understanding of the different parts of the climate system – and how they interact as a whole in response to actions (i.e. its emergent behavior) – good and bad – can activate people to take more effective action themselves through personal behavior change, but also lobby for the kind of systems change that is ultimately required.

However, as highlighted in a 2022 UNESCO report (UNESCO 2022)², 70% of young people surveyed stated that *“they could not explain climate change, or could only explain its broad principles, or do not know anything about it”*. This is unsurprising given that school teachers too are open about their lack of understanding of, or formal education on climate change. Teach the Future have reported that 79% of teachers surveyed are *“not*

¹ Ballew, M. T., M. H. Goldberg, S. A. Rosenthal, A. Gustafson, and A. Leiserowitz. 2019. Review of *Systems Thinking as a Pathway to Global Warming Beliefs and Attitudes through an Ecological Worldview*. Proceedings of the National Academy of Sciences. 2019. <https://climatecommunication.yale.edu/publications/systems-thinking-can-support-public-understanding-of-climate-change/>.

² UNESCO Global Survey Report on Youth Demands for Climate Change Education. 2022. Unesco.org. 2022. <https://www.unesco.org/en/articles/cop27-unesco-launches-global-survey-report-youth-demands-climate-change-education-mobilizes>.

teaching about the ecological crisis in a meaningful and relevant way”, and 70% of teachers “feel they have not received adequate training to educate students about climate change” (Teach the Future, 2022).

The objective of the work presented in this paper can be framed as the following ‘*how might we*’ statement.

How might we (the StrathCAN community) develop an educational offering that will exercise the full range of UNESCO competencies in students (with a focus on systems thinking) and facilitates their -

- **understanding of the problem** of climate change, i.e. the different parts of the earth system, how these interrelate, and the causes and consequences behind anthropogenic climate change.
- **exploration of the solutions** required for effective, just and urgent climate mitigation and adaptation, and how these should be prioritized and coordinated.

Additionally, we must also consider how we can achieve this in a way that is scientifically and academically robust, meaningful, impactful, engaging, collaborative, empowering, fun and scalable in a sector that is resource constrained. As is consistent with the general consensus around ESD pedagogies, it is clear that what is also required are new, transformative, learner-centred, experiential, problem-based, reflective, active teaching and learning methods. These methods should motivate students to embrace a deeper level of thinking, empathy, feeling, understanding and action; that can connect the student to the subject matter of sustainable development and climate change. Or, perhaps more appropriately, the ‘challenges’ of these, not just cognitively, but emotionally and practically too – a head, heart and hands approach. This will involve exercising and developing competencies in our students that stretch their ways of thinking, being and practicing both within and beyond the disciplinary boundaries of the subject domains. This has been key in the framing of our StrathCEKO, and subsequently StrathCAN, mission.

3. StrathCEKO and Education for Sustainable Development

2.1. Understanding the Problem’ of Climate Change through a Climate Fresk Workshop (or the ‘Science Piece’)

The first ‘off-the-shelf’ offering considered, Climate Fresk, is a highly engaging, gamified workshop, where groups of 8 participants congregating around a table and working with a trained facilitator. Participants are issued with a steady stream of Climate Fresk cards, containing information derived from the latest IPCC Assessment Report³, over the 3.5 hour-long workshop. Climate Fresk workshops are designed to facilitate conversations among participants and challenge their assumptions in relation to the mechanisms of climate change. Each card represents a key part of the earth’s climate system, including influences on it and the impacts of it. Here, participants are challenged to use these cards to incrementally create a ‘fresk’ or from a ‘systems thinking’ perspective, through formation of a causal-loop diagram, which graphically depicts the complex interconnections of the earth climate system, its causes, effects and impacts. In terms of UNESCO competency development, this workshop helps participants exercise their *anticipatory* and *systems thinking* competencies as they gain an understanding of possible, *future*, emergent earth *system* behaviour, involving feedback loops and climate tipping points, and the potential

³ IPCC. 2019. “Sixth Assessment Report — IPCC.” Ippc.ch. IPCC. 2019. <https://www.ipcc.ch/assessment-report/ar6/>.

impacts of this behavior on our more widely and highly interconnected ecological, social and economic systems.

2.2. *'Exploring the Solutions' to Climate Change through an En-ROADS Workshop (or the 'Policy Piece')*

The second 'off-the-shelf' offering is En-ROADS, a climate change simulator developed by Climate Interactive and MIT. It can be used as an interactive, group, roleplaying game that helps participants learn about the range of impactful (and perhaps not so impactful) solutions for limiting global temperature rise and mitigating climate change. Participants play the roles of members of a convened (mock) emergency UNFCCC climate negotiations meeting and use the tool to play-out global policy interventions and analyse the implications of these.

The En-ROADS tool builds on the seminal World3 model developed initially as part of the Limits to Growth work developed by MIT researchers under the leadership of Jay Forrester and commissioned by the Club of Rome. Despite the complexity and sophistication of the models underpinning the En-ROADS simulator tool, it is extremely versatile and inclusive. This allows participants from a range of educational and employment backgrounds, from school pupils to policymakers, to engage in discussion and debate around various themed contexts around decarbonization and just transitions. The simulator can be used to facilitate group discussions focused at a high-level, or on more in-depth explorations of climate solutions involving combinations of (policy) solutions to accelerate change, considering multi-solving opportunities (e.g. around climate and health issues for example) as well as exploring unintended consequences (e.g. land-use, taxation and rising energy costs, etc.). Understanding these interactions, demands a systems thinking mindset, as does understanding the delays between actions and causes, and impacts and consequences on sea level rise, flood risk, etc. and the wider impact on biodiversity as well as our social and economic wellbeing. Critically, this simulator and accompanying workshop can demonstrate the reality of there being 'no silver bullet' solution, and instead explores the combinations of policy actions that may most impactful vs those which may be less so. It allows discussions around leverage points, where "a small shift in one thing can produce big changes in everything" (Meadows 1999)⁴.

An initial taster workshop was arranged to familiarise participants with the tool during the University of Strathclyde's sustainability month, and as a COP26 fringe event, using external facilitators from the Youth Climate Action Network (Y-Can). Follow up discussions and consultation with Y-Can supported the development of a package of resources for training staff on using the tool in its multiple formats (Climate simulation workshops, UnSummit role play game, or simply as a targeted game-based, scenario formation assignment). A StrathCAN member then worked with these resources to develop workshop material and facilitator guidance. They delivered the role-play workshop (using the guidance) to a StrathCAN audience, with the intention of garnering feedback and engaging other StrathCAN members in further development, enhancement and roll-out of the workshop. The En-ROADS tool has also been embedded in the curriculum in sustainability oriented postgraduate credited classes and integrated as part of group exercise, in addition to involving both formative and summative assessment in two modules.

⁴ Meadows, Donella. 1999. "Leverage Points: Places to Intervene in a System." The Academy for Systems Change. 1999. <https://donellameadows.org/archives/leverage-points-places-to-intervene-in-a-system/>

In terms of UNESCO competency development, this workshop allows students to play out alternative global emission & temperature *futures* (exercising *anticipatory* competency) associated with the interaction of different climate policy scenarios and analysis of the ecological, social and economic impacts of these. Thus, encouraging *systems* and *critical thinking* around the feasibility/desirability of their outcomes, additionally emphasising the difficulty in reaching *collaborative* consensus across different stakeholder groups (as participants take on different team roles from climate hawks to conventional energy providers). Therefore, this requires participants to exercise their integrated *problem solving and strategic competencies* in their attempts to argue for a policy consensus.

3. Building the StrathCAN and Case Studies in Education and Science Curricula

The StrathCAN network emerged from our initial engagement with French NGO Climate Fresk and US think tank Climate Interactive and UK Y-CAN around our hosting of YOUNGO's 16th Conference of Youth at Strathclyde, during COP26 in Glasgow. Such was the success of our initial StrathCEKO event, there was an appetite amongst staff and students who had engaged with this event to create a COP and Conference of Youth (COY) legacy, and establish a climate education community that would enable the scale-up of Climate Fresk activity initially, but climate education more broadly and more consistently.

The StrathCAN network was initially coordinated by one member of staff. However, to make the network more sustainable in its operation, a MS Teams site was created, where staff can share opinions and material, but also post workshop opportunities and calls for support that can be broadcast across the StrathCAN community. It is evident that there appears to be a core group of particularly well-engaged and active staff. With this group of individuals now well-established and committed to supporting and promoting the StrathCAN network. Our attention is turning to integrating StrathCAN with our Organisational and Staff Development Unit (OSDU), to ensure training in any StrathCAN workshops is made more routinely and formally available to staff as CPD, and ultimately students in their curricula.

The following sections offer two separate case-studies of how StrathCAN supported workshops have been embedded in curricula in the School of Education and the Department of Pure and Applied Chemistry at the University of Strathclyde.

3.1. Using StrathCAN to embed Climate Education in the School of Education

The education system in Scotland has long held a place for sustainability education, social justice and global citizenship in its structures (Allan 2013)⁵. However, it was the implementation of Scotland's new national curriculum in 2010, known as The Curriculum for Excellence, and the adoption of the recommendations made by the One Planet Schools Working Group into the national curriculum that cemented a formalised recognition of the role that education can play in achieving objectives associated with sustainability challenges in Scotland. This area of the curriculum took the form of 'Learning for Sustainability' (LfS), which is a term specific to the Scottish Educational context. LfS is an umbrella term that includes ESD, Global Citizenship Education and Outdoor Learning (Education Scotland, 2023). The use of the phrase 'learning *for* sustainability' is by actively

⁵ Allan, Alasdair. 2013. Review of *Learning for Sustainability: The Scottish Government's Response to the Report of the One Planet Schools Working Group*. Scottish Government. March 2013. <https://education.gov.scot/media/nqnf3ws/scottish-government-response-to-the-one-planet-schools-working-group-march-2013.pdf>.

engaging with sustainability challenges, rather than passively engaging them by simply 'learning *about* sustainability'.

Delivering LfS based learning experiences is recognised as a responsibility for all primary school and secondary school teachers in Scotland and this is evidenced in the renewed 'Standard for Full Registration' set by the General Teaching Council for Scotland (GTCS 2021)⁶. According to this standard, it is the expectation of all teachers to embrace '*global educational and social values of sustainability, equality, equity, and justice*' and to '*support learner's understanding of themselves, others and their contribution to the development and sustainability of a diverse and inclusive society*'. LfS also forms part of school evaluation and improvement frameworks such as How Good is Our School, which includes '*learning for sustainability is embedded across our curriculum*', '*the school promote[s] a coherent whole school approach to learning for sustainability*' and '*staff work collaboratively to strengthen their understanding and implementation Learning for Sustainability*' (Education Scotland 2015: 23,35)⁷.

The Strathclyde School of Education (SoE) is the oldest and largest Initial Teacher Education (ITE) provider in Scotland. The context given above was a prime motivator for the Strathclyde SoE's active engagement with StrathCAN, where a significant number of students and staff participated in StrathCAN supported climate workshops. These workshops were identified as being particularly attractive specifically in terms of the resource's game-based-learning pedagogy and of its scalability as a peer-to-peer, facilitator model. Additionally, these offered a practical means of providing ITE & Continual Lifelong Professional Learning (CLPL) programme support for practitioner attainment of GTCS Professional Standards associated with ESD training requirements.

The SoE supported by StrathCAN successfully took these workshops to year 3 and 4 of UG Primary Education students, as well as students studying Professional Graduate Diploma in Education (PGDE Secondary).

A key consideration for the SoE was to not only educate participants on climate change, but also to prepare them to facilitate these workshops, specifically involving an audience of young people. This ultimately led to a first successful pilot within a Scottish school and to student-to-student instruction of the resource across the entire final year cohort and subsequently to successful publication of the experience by one of the students involved (Low, K & Collins, R 2023)⁸. However, slight adaptations were required, which involved participants using the 'child' set of Climate Fresk cards in order to provide a reference point as to how seemingly complex knowledge can be shared with young people in an accessible way. Secondly, the timing of the activity was extended to allow for 'teaching points' to be built into the process. Anecdotes, explanations, examples, pop-culture references and links to the curriculum for participating subjects were shared to build

⁶ *The Standard for Full Registration Mandatory Requirements for Registration with the General Teaching Council for Scotland*. 2021. The General Teaching Council for Scotland. General Teaching Council for Scotland. August 2, 2021. <https://www.gtcs.org.uk/wp-content/uploads/2021/09/standard-for-full-registration.pdf>.

⁷ *How Good Is Our School? 4th Edition*. 2015. Education Scotland. 2015. https://education.gov.scot/media/2swjmnbs/frwk2_hgios4.pdf.

⁸ Low, Karen & Collins, Robert. 2023. "Climate Fresk: Initiating ESD challenges in Strathclyde and beyond". Accessed 10th June 2023. (newsweaver.com)

capacity and help make the subject-matter and issues it raised accessible to the young people that the students will ultimately teach.

As part of this extended pilot, approximately 100 PGDE students participated in the Climate Fresk workshop. A majority of these students spent eleven weeks on placement in a high school following this session. Considering an approximate number of class groups a student teacher may teach and the number of learners in those classes, it is estimated that a potential 18,000 young people received input from a student teacher with the ability to embed a climate informed pedagogy into their professional practice the months following the session. This impact was created as a direct result of the organisers being trained Climate Fresk facilitators, and as supported members of the StrathCAN Network. Furthermore, being a member of this network has led to the SoE's collaborations with other Faculties and Departments (i.e. from Pure and Applied Chemistry – see next case study), and also supporting the Department of Physics in scoping exercises for workshop deployment in academic year 2023-24

3.2. Using StrathCAN to embed Climate Education in the Department of Pure and Applied Chemistry

Chemistry education is focused on broad knowledge and in-depth understanding of chemical concepts, problem solving in the context of chemistry, and practical laboratory skills. Chemistry study programmes also develop skills needed for employment in chemical and non-chemical roles, for example through employability skills development courses. These focus often on project management, numeracy, data handling, and accessing scientific literature. Recent changes to the UK QAA Subject Benchmark Statements for Chemistry⁹ include references to sustainability and the environment in several places and going forward the Royal Society of Chemistry will measure the application and interpretation of the benchmark statements in degrees through the accreditation scheme. These benchmark statements will affect similar change across all degree disciplines and programmes, in all Higher Education Institutions across the UK. In the Department of Pure and Applied Chemistry (PAC) at the University of Strathclyde, initial mapping showed that sustainability is not yet widely covered or even explicitly mentioned in existing programmes. This is despite subdisciplines and courses potentially aligning well with sustainability, for example through the UN Sustainable Development Goals (SDG's).

The wider vision is to embed ESD into all chemistry programmes. However, in the short term we explored different options and decided to focus on using *Climate Fresk* as an activity in undergraduate teaching. Starting in academic year 22/23 we integrated it into the 'Career Skills Development' module of year 3 of the MChem degree, which is a core module taken by all PAC students. This allows us to educate students about the causes and impacts of climate change in addition to developing competencies and knowledge that is increasingly sought after by employers in the chemical industry, and more generally. *Climate Fresk* was particularly attractive as it is an 'off the shelf' solution that has been successfully used at University of Strathclyde events with student groups and is also relatively easily scalable. This was very important given that between 120-150 students would take part in the activity. The *Climate Fresk* workshops are currently taking place with two groups of 50-60 students each with one workshop held per semester and relies on trained members of StrathCAN to facilitate them.

⁹ Subject Benchmark Statement - Chemistry. 2022 www.qaa.ac.uk. Accessed July 27, 2023. <https://www.qaa.ac.uk/the-quality-code/subject-benchmark-statements/chemistry>

Based on anecdotal feedback from the co-facilitators and personal observations, we found that students are usually very engaged in the workshop and participate with little or no prompting. Students are usually able to understand the underpinning science well, which is probably also related to the fact that similar concepts are taught in their study programmes. Nevertheless, students find the 'fresk building' part of the activity "insightful" and provides the "ability to discuss climate change and its causes and effects" with others. Observations we have made for the cohorts include: Students understand individual concepts that underpin climate change science; however, they were previously unable to express causes and effects. Students often also mention that they were not aware of 'feedback loops' and 'climate tipping points'.

The workshops end with an activity that aims to provide solutions to climate change, which is particularly important given that participants express to feel "negative" and "powerless" in the face of climate change. The success of this end-activity depends a lot more on the co-facilitators experience and engagement with the students. Post-workshop feedback from participants mentions "being mindful of diet, travel and energy usage", "recycling and using public transport", "using more sustainable products" as well as "being aware of more sustainable fashion choices" as actions to personally pursue going forward with few mentions of collective actions or normative change. This suggests that a more explicit sign posting towards systems-thinking and value-thinking approaches to work towards solving climate change may be required.

As mentioned previously, creating a powerful and engaging narrative for the program 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 program.

4. Future Plans and Opportunities for StrathCAN

The StrathCAN network is growing with its membership currently standing at around 50 staff and students. To become a member requires staff and students to undertake training in one of these workshops such that they themselves are able to then organize and facilitate a Climate Education workshop (often with the support of other StrathCAN members). However, not all trained staff and student StrathCAN members are actively using their newfound facilitation skills. Speculating on the reasons for this lack of engagement from some members of the network - it may be due to workload pressures, or perhaps a lack of confidence. In a sense there is an expectation of some natural level of attrition when establishing volunteer networks such as this. We plan to administer a membership survey to ascertain why staff or students have yet to fully engage where that is the case, and then work together as a network to address any barriers that may be inhibiting them from doing so.

However, there are still many across the network who are very engaged, whom we expect to continue to run programmes of Discovery and Training Workshops for both Climate Fresk and En-ROADS as part of our Continuous Professional Development offering at Strathclyde. This will involve StrathCAN working in partnership with our Organizational Staff Development Unit (OSDU) to support the promotion, timetabling and hosting our workshops. Of note, the workshops will be facilitated by trained staff and/or students from the StrathCAN network.

The StrathCAN network is continually looking for opportunities to run workshops, both inside and outside Strathclyde, either as a curricular, extra-curricular or outreach and community engagement activities. Examples have been as a Strathclyde fringe event at COP26, our annual Engage event, which invites staff to propose activities to engage with the wider public, and as an invited workshop at the Annual Environmental Association for Universities and Colleges (EAUC) Scotland Conference.

The vision and future purpose of StrathCAN will be to continue to bring staff and students together to deliver off-the-shelf Climate Education offerings in the form of workshops, role-play games, etc. that can be delivered confidently by our staff and quickly embedded in our formal and informal curricula. In addition to these 'off-the-shelf' offerings, our vision is also to build a community of practice of staff and students that is encouraged and supported to continue to enhance these existing offerings and co-create and deliver their own educational offerings that can be shared widely.

One particular modification we are currently focusing on is building Carbon Literacy Project content into the Climate Fresk workshops to give more structured focus to the '*Global Citizen and Personal Responsibility/Behaviour Change Piece*' that we hope will enhance the self-reflection part of the workshop and encourage more guided *normative thinking* and *self-awareness* reflection around personal choices, behaviours, feelings and actions.

As mentioned previously in this paper, the UK QAA Subject Benchmark Statements have been, and will continue to be instrumental in steering UK HEIs on a course towards mainstreaming ESD and Climate Education. The StrathCAN network is therefore seen as a community of practice that will serve Strathclyde well in developing practical and academically robust climate education offerings that can support our wider strategic commitment to place ESD and Climate Education at the heart of our curricula.

5. Conclusion

This paper provides an overview of the implementation of StrathCEKO and subsequent development of the active StrathCAN community at the University of Strathclyde. It highlights the benefits of using 'off-the-shelf' established workshops such as Climate Fresk and ENROADS as part of the solution to providing resource-constrained institutions (such as Universities), with effective tools to facilitate and expand on climate change education.

Driven and supported by the motivated StrathCAN community, climate education has been successfully integrated into the curricula of education and chemistry degree programmes at the University of Strathclyde, and there are plans for further expansion into other Departments and programme curricula. Therefore, with a strategic commitment to ESD and climate education at an institutional level, it is clear that StrathCAN has an integral role to play in introducing climate education more widely throughout the University.

While we may all be familiar with the well-known saying "knowledge is power", participating in the StrathCAN community has highlighted that sharing knowledge and supporting resource between and across Departments and Faculties, and breaking down teaching silos, is where the real power lies. Through collaborative, cross-faculty and departmental learning opportunities and co-creation of knowledge, StrathCAN has, and continues to, harness staff and student enthusiasm, from the bottom-up, which will be key to expanding the StrathCAN community and scaling up climate education across the institution, and ultimately promote individual and collective action to tackle climate change, provide a sustainable future for all.