Climate Change and Sustainability Education
CON
Initiatives to promote Open Schooling supported by the CARE-KNOW-DO framework
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Collaborative Green Forum Network

This report examines the interplay and close cooperation between universities, schools, enterprises, and wider society for the joint development of actions for CCSE ‘Climate Change and Sustainability Education’.

We argue that CCSE, as the integration of sustainability and eco-consciousness at all educational levels, should empower learners by providing competences to identify issues and responsible actions to shape a liveable planet for all.

This Delphi study investigates CCSE challenges and opportunities for a new education movement to combine strategies, initiatives, and interventions supported by the CARE-KNOW-DO principles and open schooling approach.

Participants were 27 expert academics, practitioners, entrepreneurs, and policymakers of the UK Green-Forum. We present 60 green initiatives and 33 green skills for the CCSE, for empowering students to CARE-KNOW-DO actions towards a sustainable world with green careers, green lives, and green societies.

Findings show 7 recommendations to tackle the CCSE’s challenges:

1. Promote flexible real context curriculum.
2. Foster cross-curricular practices with teachers’ training.
3. Establish CCSE definition with benchmarks including skills and qualifications.
4. Enhance learners’ agency through the cooperation of stakeholders and organisations.
5. Raise students’ passion for nature with a hopeful curriculum.
6. Increase green careers awareness through education, and
7. Implement tangible curriculum through policy change with equity, diversity, and inclusion.
The United Kingdom government launched the ‘Green Jobs Taskforce’ in 2020 to support the creation of two million green jobs and reach ‘net zero’.

The strategy of the Department for Education of the UK government focuses on supporting the provision of carbon literacy training for schools and universities for sustainability by 2025 through five areas:

1. **Climate education**: students will develop better understanding of climate change and greater connection to nature to tackle both the causes and impact of climate change.

2. **Green skills and careers**: students will be prepared for career paths to support the net-zero transition, the restoration of biodiversity, and a sustainable future.

3. **Education estate and digital infrastructure**: students and their communities will be inspired to live sustainable lives with a green physical environment in and around education settings to promote both their physical and mental wellbeing.

4. **Operations and supply chains**: students will be introduced to more sustainable practice for waste prevention, resource efficiency and the circular economy.

5. **International actions**: students will be inspired to support international actions to make a difference to children and young people all over the world who are facing extreme weather events.
CCSE has a key role in preparing students to identify, analyse and solve problems that affect life on the planet for this and subsequent generations. Students must be empowered to anticipate risks that threaten sustainability, or more accurately survival. Educators must be professionally prepared to design interventions that maximise high-quality education equity, diversity, inclusion, and fairness supported by green competences (Okada & Grey, 2022).
Green Competence means the effective capability to take ‘CARE’ of the planet, to ‘KNOW’ what to ‘DO’, why and how, to take responsibility for the social, economic, and natural environment. Green Competences are based on values, knowledge, skills, and attitude to anticipate, intervene, respond, and solve real world sustainability problems considering the interdependent effects of climate change and other factors that affect life for all (Okada & Grey, 2022).
Open Schooling is a recent term promoted by the European Union that refers to schools as agents of wellbeing (Hazelkorn et al., 2015).

Open Schooling means students working on real-life issues, problem-solving, and decision-making with engaging participatory tools and scientific methods supported by enterprises, universities, communities, and policy makers to develop the competences that they need for a sustainable life and desirable future (Okada & Sherborne 2018).

To operationalise the open schooling process in all levels of education, the CARE-KNOW-DO framework (Okada, 2023) was created to foster collaborative learning among students, teachers, scientists, and families.

We-CARE: The first stage is mainly informal learning with professionals and family that engages students with the challenge around real-life and future-orientated issues to stimulate questions and create a ‘need to know’, which teachers can harness in the next stage.

We-KNOW: The second stage is formal learning focused on students acquiring the scientific understanding and skills they need to make decisions and take action in the final stage.

We-DO: In this stage, students apply the acquired skills and knowledge to participatory science actions, defining ways to approach the given challenge and minimise its impact.
CARE-KNOW-DO is a practice methodology for making science more meaningful, engaging, fun, and relevant, enabling students to develop knowledge, skills, and attitude with enjoyment.

CARE–KNOW–DO has been proposed as a pedagogical basis to enable authentic learning based on students’ deep involvement with real-life issues and partnerships with societal representatives from home, schools, universities, enterprises, and policy departments.

In the context of transnational research projects, the CARE–KNOW–DO framework supported various initiatives, among them, ENGAGE (page 79), and CONNECT (page 87) both funded by the European Union.

Currently, the framework has been used by educators, designers, and policymakers to promote STEAM career development and a greener curriculum.

It supports problem-solving and inquiry-based learning by situating the curriculum content within three integrated phases:

- CARE—refers to students’ engagement with real-life problems that matter and motivate them to learn.
- KNOW—refers to students’ acquisition of knowledge to understand the problem and discuss solutions.
- DO—refers to students’ performance of a science action to develop skills and solve problems using the knowledge learned.
CARE means firstly ‘looking after’ the environment and life around us, as stewards for future generations.

Secondly, it also means something that matters or has value to me, such as, for example, eliminating pollution, poverty, and global warming.

CARE helps students, in conjunction with experts and society, to develop the ethical values and responsible attitudes that are fundamental to Responsible Research and Innovation (RRI).

It should support learners to discuss real-life problems and develop research-based, innovative solutions whilst aligning scientific and technological advances with societal needs and values (Figure 1).

This is all relevant for students’ affective engagement, and to raise the intrinsic motivation necessary for them to develop agency. It promotes interest and a need to know.
Care means firstly 'looking after' the environment and life around us, as stewards for future generations. Secondly, it also means something that matters or has value to me, such as, for example, eliminating pollution, poverty, and global warming.

Care helps students, in conjunction with experts and society, to develop the ethical values and responsible attitudes that are fundamental to Responsible Research and Innovation (RRI).

It should help learners to discuss real-life problems and develop research-based, innovative solutions whilst aligning scientific and technological advances with societal needs. This is all relevant for students' affective engagement, and to raise the intrinsic motivation necessary for them to develop agency. It promotes interest and a need to know.

The hierarchy of needs for CARE within our CARE-KNOW-DO framework is therefore as follows:

1. I am in education because I care, and others care about me.
2. I care about myself and my future.
3. I care about the future of others close to me and my local environment.
4. I care about the future of others and their local environments.
5. I care about the future of the planet as a global ecosystem.

Figure 1. Hierarchy of needs regarding values (CARE) (Okada, 2023)
**KNOW** is a key requirement for students to develop hard and soft skills including problem solving, communication, teamwork, and self-management.

Open schooling is considered as a possible approach to help students connect formal, non-formal and informal knowledge, inside and outside school environments.

It creates opportunities for students to expand their ‘knowing’ in real-life context and develop skills, attitudes, and values with others. These include, for example, independent critical-creative thinking and complex-systemic reasoning supported by evidence-based knowledge.

The support from a variety of societal actors—teachers, experts, family, and community members is fundamental for learners to KNOW what, why, how, where and whom to acquire knowledge from reliable sources (Figure 2).
I am in education because society wants me to know things.

Figure 2. Hierarchy of needs regarding knowledge (KNOW) (Okada, 2023)
DO, take actions, and solve Climate Change problems with knowledge, skills and attitude and values are key actions for society and government to ensure sustainability.

Education will need to support these actions and changes in the way we live around us, as stewards for future generations.

Climate change requires interventions with solutions to the problems of a warming world, and ways of adapting to change.

A better way to evaluate educational outcomes would therefore be to look at actions taken or activity resulting from learning.

This type of assessment would be based on assessment-in-context; for example, students’ knowledge-in-action or knowledge-through-action (Figure 3).
The hierarchy of needs for CARE within the CARE-KNOW-DO framework is as follows:

I care about the future of the planet
I care about myself and my future
I care about the future of others and their environment
I care about the future of others close to me and my local environment

I am in education because I care, and others care about me

Education involves doing things informed with knowledge

We achieve planetary survival with wisdom
We take knowledgeable actions to change the system
We reflect and take action with others so we can improve our future

Figure 3. Hierarchy of needs for action (DO) (Okada, 2023).
CCSE: Challenges and recommendations

A Delphi study with 27 expert academics, practitioners, entrepreneurs, and policymakers of the UK Green-Forum presents seven recommendations related to seven respective challenges (Figure 4):

1. Promote flexible real-context curriculum that can be updated faster to align sustainability to real-life issues.
2. Foster cross-curricular practices with teachers’ training with inter/multi/transdisciplinary approaches for example, biochemistry, ecology, natural history, sociology, and politics.
3. Establish CCSE definition with benchmarks including skills and qualifications to support formative assessment with accountability, learning goals and achievements.
4. Enhance learners’ agency through the cooperation of stakeholders and organisations for encouraging the necessary policy changes and to make schools as agents of well-being.
5. Raise students’ passion for nature with a hopeful and enjoyable curriculum by empowering them with knowledge, skills, attitude, and values in a meaningful way.
6. Increase green careers awareness through education, considering climate change and sustainability as important as literacy and numeracy.
7. Implement tangible curriculum through policy-change with equity, diversity, and inclusion to support fair societies with real and manageable outputs, to enable policy change and impact.

Figure 4. Challenges and opportunities to embed CCSE in the curriculum (Okada, 2023).
During the Delphi study, a Padlet (https://padlet.com/alexandraokada/CCSE) was used to aggregate the latest reports and initiatives shared by participants (Okada & Gray, 2023).

Our document analysis examined the interrelationships between the latest green skills components and practices, considering values to be cared about, knowledge to be known, and attitudes towards what is to be done, putting knowledge and values into action.

To support this analysis, the CARE-KNOW-DO principles were used to explore skills to help learners with engagement, knowledge, and actions.

Figure 5 illustrates three sets of skills (macro lenses) for green careers, green life, and green society to be developed through the connection between formal, informal, and non-formal learning among schools, universities, enterprises and communities, a process which can be enhanced by open schooling.

The CARE-KNOW-DO (micro-filter) groups and links the skills, aiming at supporting stakeholders, communities, and organisation.
Figure 6. Skills considering values (CARE) to enhance green careers, green life, and green society.
CARE refers to the type of skills learners need to develop to ensure that values and local needs are taken into account from the perspective of enterprises (green careers), individuals (green life), and communities (green society) (Figure 6).

In terms of Green Careers, four skills were selected:

- **Local sustainability support**: ability to meet local demands, adapt to local settings, and become actively involved in local sustainable development.
- **Apprenticeship with experts**: ability to learn from scientists or professionals about their green jobs and become aware of the green skills that may be needed in new kinds of careers.
- **Diversity-Inclusion teamwork**: ability to work in inclusive and diverse teams with underrepresented or underserved people.

Regarding Green Societies, four skills are relevant, underpinned by inclusion, diversity, equity, and social-economic-environmental justice:

- **Respect for life and environment**: ability to value health and wellbeing and reflect on socio-scientific issues that may affect living organisms and the environment.
- **Climate change resilience**: ability to identify uncertain and unexpected needs caused by climate change and discuss how to respond to minimise the effects on sustainable development.
- **Reimagining wellbeing green scenarios**: ability to foster green urban spaces, rural areas and preserve green cultural heritage.
- **Valuing Equity-equality/fair societies**: ability to contribute to teamwork, value equality and support fair communities (e.g., in group discussion, teamwork, community-based projects).

The intersection of both lenses is sustained by skills for Green Life at the centre, which refers to individuals’ behaviours and actions as the agents of change towards sustainable living:

- **Protecting-looking after**: ability to take care of oneself and others.
- **Awareness-Responsiveness**: ability to recognise issues and respond to them promptly.
- **Growth mindset**: ability to cope with emotions, cognitive challenges, and uncertainty.
- **Empathy-Solidarity**: ability to support others with understanding and kindness towards sustainability.
Figure 7. Skills considering knowledge (KNOW) to enhance green careers, green life, and green society.
'KNOW’ refers to transferable and subject matter knowledge skills to solve problems, develop new products or processes, or train others, which are clustered into three domains (Figure 7).

In terms of Green Careers, four skills were selected:

- **Health, nature, and biodiversity**: ability to understand about good health and life on Earth, freshwater, renewable energy, nutrition and food security, medicines, and protection of living beings.
- **Climate change decarbonisation**: ability to understand about global warming and greenhouse gas emission, mitigation actions to reduce emissions and adaptation action to manage the risks.
- **Circular economy with no pollution**: ability to understand about regenerating nature and keeping waste out of the environment by sharing, reusing, repairing, and recycling existing materials and products as long as possible.

Regarding Green Societies, three skills were identified:

- **Critical thinking**: ability to analyse, evaluate and develop an argument, along with the evaluation of evidence, including concepts, principles, and assumptions.
- **Multidisciplinary thinking**: ability to foster participation in multi-, inter- or transdisciplinary learning incorporating integrated thinking, supported by all branches of sciences (natural sciences, mathematics, human and social sciences).
- **Socio-economic lifelong learning**: ability to benefit from lifelong learning for future wellbeing, supporting green socio-economy.

The intersection between both groups represents the central cluster of key skills for green life:

- **Scientific thinking**: ability to solve problems supported by scientific sources, scientific methods, and scientific experts.
Figure 8. Skills considering actions (DO) to enhance green careers, green life, and green society.

**Skills for Green Careers**
- a. Digital research & data science
- b. Project management for RRI
- c. Communication
- d. Ecopreneurship

**Skills for Green Life**
- a. Problem-solving/Decision-making
- b. Teamwork
- c. Networking
- d. Eco Leadership

**Skills for Green Society**
- a. Socio-scientific argumentation
- b. Working together within complexity
- c. Sustaining strong communities
- d. Eco governance to manage change
‘DO’ brings together three sets of four skills (Figure 8) for learners to establish in action towards green careers:

- **Digital research and data science:** ability to answer to question or solve problems with a methods and data analysis
- **Project management for RRI:** ability to create and develop projects with the team members considering scientific and technological advances aligned with societal needs.
- **Communication:** ability to communicate clearly and scientifically considering diversity, inclusion, and equity.
- **Ecopreneurship:** ability to situate nature and climate at the core of a business model with income for local livelihoods supported by more resilient, inclusive, and sustainable approaches.

Congruently, skills to enhance green societies are:

- **Socio-scientific argumentation:** ability to discuss the social consequences of science with arguments and evidence from multiple, reliable sources.
- **Working together within Complexity:** ability to investigate complex questions, scenarios, weigh the evidence, identify, and interpret uncertainty.
- **Sustaining strong communities:** ability to develop and sustain strong communities by engaging all members and external public.
- **Eco governance to manage change:** ability to design, implement and evaluate multi-level policies, for positive change and maximising benefits.

The intersection of both sets is based on key skills for green life:

- **Problem-solving/Decision-making:** ability to identify and use, reliable sources of information to respond to problems and make decision
- **Teamwork Negotiation:** ability to support group negotiation that can lead to improved outcomes, resolution of conflicts and increased team cooperation.
- **Social Networking:** ability to build and nurture interactions, connections, and relationships with others.
- **Eco Leadership:** ability to lead collective actions to ensure a healthy society and healthy environment with sustainable development.
Learning Ecologies

Ecological theories of learning consider that learning takes place in multiple environments over time.

The term “learning ecologies” refers to ecological perspectives on human development (Bronfenbrenner, 1979) whose processes and outcomes occur within a wide range of rich habitats.

This means that the specific learning ecologies inhabited by students shape their learning opportunities.

The more diverse, interactive, challenging and engaging their learning ecologies are, the richer, more meaningful, and more transformative their learning will be.

We argue that learning ecologies can be built through open schooling networks, thus providing students with a rich diversity of habitats and encounters with distinctive societal actors (Figure 9).

These habitats include schools, outdoor spaces, living knowledge labs, and universities, whilst actors include families, local communities, educators, and policy makers at local, regional, and national levels.

These interactions, in conjunction with real-life problem solving, will expand students’ capabilities to CARE about, KNOW about and DO something about, in order to ensure sustainability.

The CCSE movement supported by open schooling and the CARE-KNOW-DO framework is, therefore, an ideal vehicle to nurture and enhance students’ affective, mental, and physical development (Figure 10).
Figure 9. Learning Ecologies with networks, open schooling & CARE-KNOW-DO framework (Okada, 2023).
CLIMATE CHANGE AND SUSTAINABILITY EDUCATION MOVEMENT

with networks, open schooling & CARE-KNOW-DO framework

Raise learners’ passion for sustainability
Enhance learners’ agency through the cooperation of stakeholders & organisations
Increase learners’ green careers awareness
Promote a real-context curriculum that is flexible, hopeful, and tangible
Establish CCSE benchmarks, skills, and qualifications
Support policy change with equity, diversity, and inclusion
Foster real-life cross-curricular practices with teachers’ training

Figure 10. Climate Change and Sustainability Education movement through Learning Ecologies (Okada, 2023).
Green Initiatives

Society

01. EDEN Project: building relationships between people and the natural world
02. Harmony Project: putting sustainability and nature at the heart of learning
03. Chester Zoo: supporting educators and students to learn new conservation skills
04. ZSL Zoo: re-engage students with nature and the world around them
05. WWT: creating connections with nature through storytelling and adventure
06. Black2Nature: nature camps, events, and environmental and sustainable projects
07. Black Girls Hike UK: encouraging Black women to reconnect with nature
08. OASES: outdoor and sustainability Education specialists
09. Songbird Survival: creating solutions to protect songbirds with funding research
10. Learning Through Landscapes: enhancing outdoor learning and play for children
11. Urbanwise: discovering London city and taking positive action on climate change
13. Natural Thinkers: connecting children to nature

University

14. Climate Education Action Plan: promoting better climate education
15. STEM Learning Centre: STEM Education for all young people across the UK
16. CCC-CATAPULT: children’s agency to tackle policy on climate change
17. Eco-capabilities: exploring children’s wellbeing with artists in outdoor places
18. Living in the Climate Crisis Project: young people in Uganda
19. Rumpus 2030: authentic learning with fun towards sustainability
20. Understanding Climate Change and Environmental Awareness Course
21. Global Goal Centre: providing a platform with resources related to the SDGs
22. OCR Green and Climate Education: learning and assessment materials
23. GCSE Natural History: new qualification for rich understanding of the natural world
24. YoungScientistJournal: international peer-review journal fully produced by students
25. The Alternative Nature Toolkit: where in the world is nature?

Schools

26. Big Research questions and real-world research to understand science in schools
27. CCS resources to understand nature and how to build a more sustainable future
28. MEI Maths: engaging learners with maths, climate change and meteorology
29. The Royal Society of Biology: recommendations and framework
30. Tomorrow’s climate scientists: addressing climate and biodiversity issues
31. Climate friendly: helps schools to learn about and engage with climate action
32. Eco-Schools: uniting young people to create positive impacts for our planet now
33. Founders4Schools: reduce the skills gap with inspirational careers education
34. OAK Garden Network: growing curiosity for a sustainable world
35. PBLworks: Project-based Learning for Black and Brown students’ achievement
36. The Chase School Climate Emergency
37. Twinkl: climate change resources related to COP26 and COP27
38. Primary Resources: materials for pupils, teachers, and parents to think scientifically

Enterprise

39. Green Economy Alliance: leaders for a sustainable economy
40. Ground Source Heat Pump Association: teaching scheme of work
41. Caplot Energy: inspired, sustainable, improvement securing a brighter future
42. Green-building-advisory-committee: together for a better-built environment
43. Biobec.eu: leveraging Education to unlock the EU bioeconomy’s full potential
44. EDBioEC Projects: innovative education for the bioeconomy
45. CPA Climate Psychology Alliance: psychological responses to the climate crisis
46. Pearson: multinational publishing

PolicyMakers

47. ENGAGE: equipping the next generation for active engagement in Science
48. OSOS – Open Schooling for open societies
49. SEAS: Science education for action and engagement towards sustainability
50. PHERECLOS: partnerships for pathways to Higher Education and Science
51. OSHUB: Open Science Hub Network: empowering citizens with STEAM Education
52. SALL - Schools as Living Labs
53. MOST: Meaningful Open Schooling Connects Schools To Communities
54. MAKE IT OPEN: inquiry-based Science education with the maker movement
55. CONNECT: inclusive open schooling through engaging and future-oriented science
56. COSMOS: Creating Organisational Structures for Meaningful Science Education
57. Multiplayers’ partnerships for meaningful engagement with science and research
58. PFASE: Partnerships for Science Education
59. ICSE Science Factory
60. LEVERS: LEarning VEntuReS for Climate Justice
61. STE(A)M Learning Ecologies
**EDEN Project: building relationships between people and the natural world**

**Leading organisation:**
Eden Project educational charity

**Target audience:**
Children and adults

**Format:**
Activities, visits

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### Green Skills

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<tr>
<th>CARE</th>
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<th>DO</th>
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<td>KNOWLEDGE</td>
<td>DIGITAL RESEARCH, MULTI-GOVERNANCE</td>
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<td>COCREATION INTERDISCIPLINARLY</td>
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**Eden is an educational charity and social enterprise. Their global mission is to create a movement that builds relationships between people and the natural world to demonstrate the power of working together for the benefit of all living things.**

The Eden project created various environments that explore our place in nature and what can be done if people who want to make a difference get together.

The visitor destination, cultural venue and global garden showcase our dependence on plants and demonstrate technological ingenuity and the regeneration of landscapes and livelihoods.

**Examples of activities:**
- Camping or glamping
- Outdoor visits
- Adventure activities
- Explore the largest rainforest in captivity
- Ice skating
- Immersive exhibits

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Harmony Project: putting sustainability and nature at the heart of learning

Leading organisation: Harmony in Education charity

Target audience: Young people, educators

Format: Practices, teaching resources

Green Skills

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<td>CLIMATE CHANGE</td>
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<td>TEAMWORK/NEGOTIATION COMMUNICATION</td>
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The Harmony Project aims to transform education to ensure it is fit for purpose in preparing young people to engage with the environmental and social challenges they face, not just to pass exams.

Educators foster and expand learning that is based upon a deep understanding of, and connection to, the natural world – learning that will equip students with the skills they need to live more sustainably.

Examples:
- Film resources to introduce staff, students, and parents to Nature's principles of Harmony
- Explore the principle of Geometry with your students using these standalone activity plans.

Website: [https://www.theharmonyproject.org.uk/](https://www.theharmonyproject.org.uk/)
Chester Zoo: supporting educators and students to learn new conservation skills

Leading organisation:
Chester Zoo

Target audience:
Public and Schools
including all key stages from early childhood education to university level

Format:
Online resources
Events and activities
Educator CPD
Project work
Research

Green Skills

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<td>EMPATHY-SOLIDARITY</td>
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<td>CRITICAL THINKING</td>
<td>ECO-LEADERSHIP</td>
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Chester Zoo offers conservation and real-world issues to explore curriculum learning.

As a conservation organisation Chester Zoo provides real examples, relevant science and access to experts, as well as access to 1000s of species of animals and plants.

Activities are designed to support connection to nature and increase empathy for wildlife, this is particularly true of zoo visits and outdoor learning experiences in schools.

Chester Zoo’s IgniteZoo project, delivered in partnership with Ignite Institute enables schools to embed conservation themes across the curriculum, whilst also driving student engagement and attainment.

Zoo-led educational programmes, visits and projects promote understanding of a wide range of relevant conservation and sustainability issues.

Resources and training programmes support teachers to develop their own knowledge and share this with their pupils, through a variety of curriculum areas.

Educators are supported to teach new conservation and sustainability topics.

Projects support schools to make green space enhancements and to make changes to supply chains, waste management or other sustainability practices.

Pupils are empowered to make similar changes in their own lives and to advocate for sustainability in their wider communities, such as with public, businesses and policy makers.

Website: https://www.chesterzoo.org/schools/
ZSL Zoo: re-engaging students with nature and the world around them

Leading organisation: ZSL Zoo

Target audience: Vulnerable young people

Format: Online information, resources events, visits, and workshops

Green Skills

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<td>EMPATHY/ SOLIDARITY</td>
<td>CONSERVATION</td>
<td>ARGUMENTATION</td>
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ZSL London Zoo offers an innovative learning programme for vulnerable young people.

They aim to provide positive experiences for those disengaged from mainstream education.

Positive impacts have been shown in the following areas:

- Empathy towards animals
- Increase in confidence around new people and experiences
- Accepting responsibility
- Managing feelings, particularly of nervousness
- Increase in attention and cognitive learning when in the presence of animal

Courses can be tailored for groups of all ages.

It also offers:

Visits/ Experiences: [https://www.zsl.org/zsl-london-zoo/experiences](https://www.zsl.org/zsl-london-zoo/experiences)

Workshops: [https://www.zsl.org/zsl-london-zoo/schools/education-sessions](https://www.zsl.org/zsl-london-zoo/schools/education-sessions)

Online Resources: [https://www.zsl.org/zsl-london-zoo/zsl-london-zoo-online-resources](https://www.zsl.org/zsl-london-zoo/zsl-london-zoo-online-resources)

Website: [https://www.zsl.org/zsl-london-zoo/schools/practical-learning-programmes-for-pupil-referral-units](https://www.zsl.org/zsl-london-zoo/schools/practical-learning-programmes-for-pupil-referral-units)
INITIATIVE 05  

WWT Generation Wild: creating connections with nature through storytelling and adventure

Leading organisation:  
Wildfowl & Wetlands Trust charity

Target audience:  
Families, primary schools in disadvantaged areas.

Format:  
Online activities

Green Skills

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Generation Wild includes free school visits (including free transport) to our Wetland Centres for primary schools in disadvantaged areas.

It engages children and their families with nature, creating a generation that will carry forward a life-long love of the natural world.

WWT creates opportunities for participants to learn about wonders of nature, how to protect, restore, and create healthy wetlands, and help bring people closer to nature.

Examples of activities for storytelling and adventure:

- Take a natural snapshot
- Make a nest
- Make a mini pond
- Search for smells
- Search for sounds
- Rescue an animal
- Discover life in a pond
- Make a shelter for frogs and toads

Website:  [https://www.generationwild.org.uk](https://www.generationwild.org.uk)
**INITIATIVE 06**

**Black2Nature: nature camps, events and environmental and sustainable projects**

**Leading organisation:** Birdgirl charity

**Target audience:** engaging BAME children, adults and communities within the South West, South Wales and London

**Format:**
Online Information
Outdoors Activities

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<td>NATURE BIODIVERSITY</td>
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Black2nature is about birding camp for young birders on the Somerset Levels.

*This initiative is inspired by an article in an American birding about the need for more Visible Minority Ethnic (VME) or People of Color (POC) to get out into nature and exploring some of the barriers.*

Black2Nature provides training and consultancy for organisations within the wider nature, conservation, environmental and education sectors. They campaign for equal access to nature across the UK and for Global Climate Justice.

*Participants are engaged in learning about biodiversity loss and species extinction and the rights of indigenous peoples. This initiative has various patrons and ambassadorships.*

The activities comprise: Nature camps, nature activities, organise race equality in nature conferences and campaign to make the nature conservation and environmental sectors ethnically diverse.

*It campaigns for equal access to nature for all but concentrate on VME communities who are currently excluded from the countryside.*

See also:
- Achievements
- Black2Nature
- Books
- Events
- Film & Media
- Charities/

Website: [https://www.birdgirluk.com/black2nature/](https://www.birdgirluk.com/black2nature/)
Black Girls Hike UK: encouraging Black women to reconnect with nature

Leading organisation: Black Girls Hike UK

Target audience: safe space for women of Black Afro/Caribbean descent only groups Nationwide age range 18+ unless otherwise stated.

Format: Online Information Outdoors Activities

Green Skills

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</table>

Black Girls Hike provides a safe space for Black women to explore the outdoors.

Its values are Building Community - Development - Education - Inclusion - Diversity

This initiative works with the wider outdoor industry to meet the needs of our community, tackling the lack of inclusion and representation.

It is an opportunity for informal learning and commitment to diversifying the outdoors.

It offers opportunities to meet popular public speakers.

They have done events with Pave the Way, The Countryside Charity, DEFRA, The European Outdoor Group, Kendal Mountain Festival and are on the line-up for the Bear Grylls Gone Wild Festival in 2021

This initiative hosts nationwide group hikes, outdoor activity days and training events.

Website: https://www.bghuk.com/
**OASES: outdoor and sustainability Education specialists**

**Leading organisation:** OASES charity

**Target audience:** Schools

**Format:**
- Outdoors activities
- Online resources

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**Green Skills**

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OASES creates a more sustainable world where all children can thrive.

It focuses on engaging young people with the natural world, helping them to understand and appreciate the planet that supports them.

OASES stands for Outdoor and Sustainability Education Specialists

OASES team delivers and promotes outdoor learning and global sustainability education for over 20 years

OASES activities are designed to inspire, motivate, and engage young people by providing them with exciting educational experiences that will lead them to be enthusiastic, creative, resilient, and confident learners.

The activities include:
- School trips
- Accredited Courses
- CPD resources
- Curriculum enhancement to become more sustainable school and develop a global ethos

---

Website: [https://oasesnortheast.org.uk/](https://oasesnortheast.org.uk/)
**INITIATIVE 09**

Songbird Survival: creating solutions to protect songbirds with funding research.

**Leading organisation:**
Songbird survival charity

**Target audience:**
Schools, researchers, general public

**Format:**
Research Projects
Online information

Green Skills

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SongBird Survival is working to change the future of songbirds by funding research into the causes of the decline and creating solutions.

More than half of our UK songbirds are threatened or already in decline.

Raising awareness of the challenges our birds and wildlife face each winter.

With Ruby Robin as the mascot, the campaign encourages everyone to take action to help garden birds and wildlife survive the harsh winter months.

Website: [https://www.songbird-survival.org.uk/](https://www.songbird-survival.org.uk/)
We help children and young people to connect with nature, become more active, learn outdoors, and have fun. Our transformation of school grounds and teacher training, alongside an unrivalled knowledge and expertise gained through practical action and research, has led to our reputation as the UK’s leading school grounds educational charity.

While still predominantly working in the education sector, our expertise has now been successfully applied to a number of different fields including dementia care, working with young homeless people, and species conservation.

We focus on school grounds because they are the one outside space that children have the most frequent access to. 8/10 teachers believe their school fails to make the most of these valuable spaces for children to connect with nature and learn and play outside.

We are working with the National History Museum and Royal Horticultural Society to deliver the DfE’s National Education Nature Park, which will support schools to survey biodiversity and take action to protect and enhance it.

With Architecture and Design Scotland, we are developing guidance to address climate change, whilst creating an outdoor environment that supports learning and play.

Our training gives teachers the knowledge, skills, and confidence to use school grounds as an outdoor classroom, across key stages and curriculum areas.

Our projects equip children with practical experience and skills to make a difference to the environment.

We believe schools are at the heart of communities and can be a valuable resource for their neighbourhoods, and that schools and communities can exchange valuable environmental skills and knowledge.

We work with landscape architects and designers across the world to help design and implement new, exciting outdoor learning spaces.

Website: https://ltl.org.uk/
Urbanwise: discovering London city and taking positive action on climate change

Leading organisation: Urbanwise.London educational charity

Target audience: Local residents and community groups.

Format: Outdoor activities and training courses

Green Skills

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<td>SOCIO-SCIENTIFIC ARGUMENTATION COMMUNICATION</td>
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Urbanwise. London focuses on engaging people in learning about their local environment and offer a range of different programmes to schools and adult groups.

It aims to empower young people to take positive action on climate change and inspire people to discover their London.

It was established in 1983 and was previously known as Hammersmith and Fulham Urban Studies Centre.

They offer a Local Studies programme of education sessions linked to the National Curriculum and a range of environmental projects during the school day.

They also offer after school clubs focused on the local environment, sustainable arts and crafts and coding.

It promotes active outdoor learning in the local environment and delivers training in Outdoor Learning and Geography Fieldwork for primary schools.

The activities include:
- guided walks and visits to places of interest with a focus on culture, heritage, wildlife, and wellbeing.
- a range of workshops focusing on art, environmental crafts, sustainability, and coding for beginners.
- short courses to local residents and community groups.

Website: [https://urbanwise.london/](https://urbanwise.london/)

The Royal Academy of Engineering commissioned a digital artist to rework classic paintings to show how engineering innovations could shape our lives over the next 30 years, informed by expert insight from some of the UK’s leading engineers.

COP26 has brought into sharp focus the debate about how the UK will address its goal of reaching net zero carbon emissions by 2050 and improving sustainability.

Engineers will shape the way we heat and light our homes, how we produce our food, how we build our houses and cities, and how we travel the world.

The UK will have to make rapid changes to enhance many aspects of decarbonisation in our lives.

These masterpieces, based on Van Gogh, Constable, Pissarro, and Monet, have been recreated to show how cleaner, greener innovations, created by engineers, could transform everyday life and landscapes in the future.

By reimagining them for 2050 they hope to start a conversation about how engineers can help shape our net zero future and inspire the next generation to join the profession.

With many engineering innovations set to revolutionise how we live and work, this series of masterpieces asks: what could a net zero world look like in 2050?

Explore museums and play with Art Transfer, Pocket Galleries, Art Selfie and more. A digital artist has reworked masterpieces by Monet, Van Gogh, Constable, and Pissarro to inspire a conversation about the engineering advances that could help to achieve net zero carbon emissions by 2050.

Website:  https://artsandculture.google.com/story/_gXRIIoYwfQtZA
INITIATIVE 13

Natural Thinkers: connecting children to nature

**Leading organisation:** Natural Thinkers

**Target audience:** Children 2 to 11 years old

**Format:** Outdoor training

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**Green Skills**

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<td>SYSTEM THINKING</td>
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Connecting children to nature - A framework for schools and childcare settings

- Being outside and connecting with nature, develops our natural instincts and gives us a sense of well-being that no artificial environment can achieve.

Natural Thinkers is a programme that supports teachers and practitioners in connecting children with nature, through practical activities that are inspiring and motivating.

It builds a framework around what schools and settings are already doing in different areas of the curriculum, particularly with a focus on STEAM (science, technology, engineering, art, and maths).

- They enable teachers and practitioners to bring all aspects of the curriculum outside with accessible activities.

Outdoor training comprises:

- Explore the Natural Thinkers commitments, which provide a framework for high-quality outdoor learning for children 2 to 11 years old.
- Explore STEAM activities
- Equip learners with activities linked to the EYFS and national curriculum.

Direct participants in how to become a Natural Thinkers accredited setting

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**Website:** [https://naturalthinkers.co.uk](https://naturalthinkers.co.uk)
UNIVERSITIES
The University of Reading is taking a leading role in ambitious efforts to cut carbon in the local area, working with policymakers and communities around the globe to apply the latest science to real climate issues, and making fast progress in cutting their institutional carbon footprint.

**Climate Education Action Plan**

The National Climate Education Action Plan has emerged from the Climate Education Summit and is informed by diverse voices. Read the Action Plan.

**Climate Ambassador Scheme**

The Climate Ambassador Scheme connects schools and colleges around the UK with climate and sustainability experts to access free support and guidance.

Their environmental and climate research is making an impact across the globe.

Their green efforts extend to the ways we work, live and study on campus.

**Climate Education Summit**

Work with others for better climate education.

Transform the way children are taught about climate change.

**Initial Teacher Education**

Climate and Sustainability Initial Teacher Education (ITE) Framework to empower student teachers to confidently incorporate climate education within their teaching.

Website: [https://www.reading.ac.uk/planet/climate-education](https://www.reading.ac.uk/planet/climate-education)
STEM Learning Centre: STEM Education for all young people across the UK

Leading organisation:
University of York

Target audience:
School teachers and student teachers

Format:
Action plan, Ambassador scheme and Initial Teacher Education

Green Skills

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<td>CLIMATE CHANGE CIRCULAR ECONOMY NO POLLUTION</td>
<td>WORKING TOGETHER WITHIN COMPLEXITY</td>
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STEM LEARNING works in collaboration with the UK Government, employers large and small, organisations and educational establishments to deliver positive STEM interactions for teachers, young people and beyond.

STEM LEARNING is dedicated to improving young people’s lives through the power of STEM education to build knowledge and skills that are vital for everyone.

Its activities offer:

1. Climate Change Adaptation - Factsheet for Children and Young People

2. Climate Detectives Supporting Resources

3. Climate change negotiations activity

4. Climate Change Education Partnership

5. Climate change - primary resources

Website:  [https://www.stem.org.uk/](https://www.stem.org.uk/)
Initiative 16

**CCC- CATAPULT: children’s agency to tackle policy for climate change**

**Leading organisation:**
University of the West of England (UWE Bristol)

**Target audience:**
Young people, educators and policy-makers

**Format:**
Co-production with young people
Multi-methods (surveys, focus groups and narrative methods)
Policy workshops

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**Green Skills**

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<td>CO-CREATION</td>
<td>ECO LEADERSHIP</td>
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This project involves young people as researchers working with academics to examine young people’s experiences of and learning around the climate crisis.

This project is taking place in locations across Europe, including Bristol (United Kingdom), Galway (Ireland), Tampere (Finland), and Genova (Italy).

This project uses a mixed-methods approach to produce research with diverse groups of young people and educators exploring the value-action gap.

Co-production in this context involves professional researchers working together and sharing power with young people to explore the value-action gap.

The project draws on a rich evidence base from research with young people and educators to produce policy-focused recommendations and resources, educational toolkits, and outputs for different audiences (young people, academics and educators, policy-makers)

The outputs will inform transformative climate education, support young people’s voices in policy fora, and lead to the co-development of tools to support educational change.

The evaluation of the process will inform co-production of research with young people (15-18 year olds).

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Website:  [https://ccc-catapult.org/](https://ccc-catapult.org/)
Eco-capabilities: exploring children’s wellbeing with artists in outdoor places

Leading organisation: UCL University

Target audience: Primary Schools

Format: Research

Green Skills

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The Eco-Capabilities Project focuses on the nature-based interventions supported by the arts-based charity Cambridge Curiosity and Imagination (CCI).

It uses a combined arts-based research and participatory methodological framework.

It is a research project exploring how the wellbeing of children living in areas of high deprivation can be supported through working with artists in familiar outdoor places.

It builds on Amartya Sen’s work on human capabilities as a proxy for wellbeing, developing the term eco-capabilities to describe how children define what they feel they need to live a fully human good life through environmental sustainability, social justice, and future economic wellbeing (the three pillars of sustainability).

The Eco-Capabilities research explores how and to what extent working with CCI artists can address disenfranchisement of Year 3 and 4 children in familiar, outdoor places that they find difficult to engage with and, thereby, support children’s wellbeing.

The Eco-Capabilities website offers films and resources.

This report documents the diverse livelihood strategies of young people living in Uganda, the impacts of climate change on their lives, and the adaptation and mitigation strategies that they have employed to address the crisis so far. By foregrounding views of young people, our research presents a vivid picture of how climate disruptions are already impacting young people. The climate crisis — the single greatest challenge of our time — is also a crisis multiplier. And Africa, home to the world’s youngest population, stands to be the continent worst impacted by climate change.

As the climate crisis exacerbates underlying social, economic, and development challenges, young people will be disproportionately impacted by climate change. They are on course for these challenges to escalate, especially for young people, as climate change deepens. This report details the early stages of a worsening situation, explores specific challenges, and proposes some solutions.

Unless we take urgent action at the local, national, and global scales, today’s young people and subsequent generations will face increasingly severe climate disruptions that will impact many facets of their lives.

1. Education should emphasise climate change and adaptation strategies.
2. Training is needed in alternative, climate-resilient livelihoods.
3. Young people need stable income sources and finance for adaptation.
4. Inclusive policy dialogue is needed to engage young people’s expertise.

Website: [https://www.cisl.cam.ac.uk/british-academy-funded-research-links-climate-change](https://www.cisl.cam.ac.uk/british-academy-funded-research-links-climate-change)
Rumpus 2030: authentic learning with fun towards Sustainability

Leading organisation:
OU UK

Target audience:
Civil Society Organisations, Universities, Schools, Enterprises, and policy makers

Format:
Research programme, supported by CCSE and CARE-KNOW-DO framework with fun participatory resources, methods and tools interlinked to open education, open schooling, open science and RRI – Responsible Research and Innovation

Green Skills

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<td>LIFELONG LEARNING</td>
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Climate change and Sustainability are key issues on today’s social educational and political agenda.

Rumpus2030 is a research programme including various funded projects underpinned by open education, open schooling, open science and RRI – Responsible Research and Innovation to foster Climate change and Sustainability Education

This research programme, supported by the CARE-KNOW-DO framework includes participatory resources, methods and tools for multi-societal actors to develop learning ecologies underpinned by practices, principles, technologies, proposals, projects, and policy recommendations at local, national, and inter/cross/trans-national levels towards the Agenda 2030 - 2050

RUMPUS2030 research programme includes a set of large EU-funded research projects, for example, ICOPER, Open Scout, weSPOT, ENGAGE and CONNECT.

It also supports various projects funded by the Brazilian government: OLAF, Open APP, UNIVERSAL, Amazon rainforest 360, and AR-in-schools among others.

Website: https://www.open.ac.uk/blogs/rumpus/index.php/rumpus-2030/
Understanding Climate Change and Environmental Awareness Course

Leading organisation:
Brighton Metropolitan College and NorthBrook College

Target audience:
Adult qualifications and professional, Online courses

Format:
Free Online Course
Up to 8 weeks

Green Skills

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The environment is currently facing the biggest challenge it has ever seen. Everyone has the power to make a difference and create a more sustainable future for the next generation.

Participants will learn about the impact of pollution, the barriers to a sustainable future, and how to challenge these barriers.

This fully online level 2 Climate Change course will teach about the principles of climate change for learners to drive positive change and become ‘greener’ in the workplace and at home. The qualification also covers the advantages of renewable energy and how to reduce energy consumption and carbon footprints for a better world.

Units:
Understand Climate Change, Sustainability, and Environmental Protection
Understand Industry and the Environment
Understand Resource Efficiency and Waste Management

This course provides an introduction to the principles of climate change and environmental awareness.

With many businesses becoming increasingly aware of their effect on the planet, there has never been a better time to increase the understanding of the environment and what can be done to become more climate conscious.

Website: [https://www.gbmc.ac.uk/ncfe-certificate-in-understanding-climate-change-online](https://www.gbmc.ac.uk/ncfe-certificate-in-understanding-climate-change-online)
Global Goal Centre (GCC) aims to support participants:

- To Recognise the social implications of this crisis, usually on the poorest people.
- To Work across all the Global Goals to help bring social and climate justice including diversity and inclusion.

GCC offers films, essays and lesson plans and telling stories. Immersive storytelling around global issues.

**Examples**

- **What is climate migration?** Videos and podcasts exploring the link between migration and climate change.
- **Fighting global misconceptions** Fake news, unreliable sources, or lack of information – cut through it all with Gapminders myth-busting resources.

GCC also provides activities for learners to take action to support sustainability.

**Examples**

- **Run a clean air & climate club** Set up your own eco-challenge club exploring clean air & climate change.
- **Walk the Global Walk** Resources for students and educators on 3 key SDGs, connecting communities across 11 countries.

Website: https://globalgoalscentre.org/resource-hub/
OCR Green and Climate Education: learning and assessment materials

**Leading organisation:**
Cambridge University Press & Assessment

**Target audience:**
Schools

**Format:**
Online resources, Curriculum content, Activities, Assessment,

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OCR highlights that non-examined learning would support student wellbeing and the development of soft skills.

OCR considers that greater use of vocational qualifications among 14 to 16 year olds and shared feedback from teachers about the importance of these qualifications which emphasise the development of personal skills and prepare students for the world of work.

OCR offers History and English Literature specifications, as well as on climate change and assessment materials.

OCR invites school communities to engage in the important debate about the future of assessment and to listen to a wide range of views and experiences.

This initiative offers a new qualification that will enable students to develop a rich understanding of the natural world: from their own local wildlife, environment, and ecosystem to critical global challenges like climate change, biodiversity, and sustainability.

GCSE in Natural History aims to reconnect young people with the natural world around them to create a world we can all live in, a vibrant and healthy planet.

‘Exploring nature in education: Developing a Natural History GCSE
understanding nature and its impact and the important role education.
Deeper engagement with biodiversity and sustainability to equip generations of young people to understand their environment and grapple with critical challenge

Address the gap in natural history content in education

It offers an opportunity for young people everywhere – from urban to rural environments – to study and connect with wildlife and the natural world.

Website: https://teach.ocr.org.uk/naturalhistory
Young Scientists Journal, an international peer-review science journal written, reviewed, and produced by school students aged 12 to 20.

Over the past decade, they have connected students from over 50 countries and have been the vehicle of choice for many in getting their work published. They are the oldest and largest organisation of this kind.

YSJ is a place for young people to publish their scientific research.

Print issues of the journal are released twice a year, packed with original research, review articles, reports, and interviews.

The journal has also bridged the gap between school and university science, introducing students to a more collaborative approach to science.

YSJ also hold annual conferences, which have taken place in Canterbury, Oxford, Cambridge, Nottingham and Bolton, and have featured talks from high-profile academics among the likes of Professor Dame Frances Ashcroft and Dr. Michael Sutherland with delegates coming in from all over the UK and Europe, as far as Hungary.

YJS provides a platform for young scientists to meet, network and form collaborations.

Website: https://ysjournal.com/about/
The Alternative Nature Toolkit: where in the world is nature?

Leading organisation:
Bristol UWE

Target audience:
Parents, Carers (and 7-9 year olds)

Format:
Digital and Physical toolkit

Green Skills

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<tr>
<td>VALUING EQUITY, EQUALITY AND FAIR SOCIETIES</td>
<td>HEALTH, NATURE AND BIODIVERSITY</td>
<td>ECO LEADERSHIP COMMUNICATION</td>
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This is a progressive, inclusive, and research-informed nature toolkit co-developed with parents/carers of 7-9 year olds.

It is developed as a toolkit in which all of the activities are low-cost or free, and can take place in a variety of environments. It seeks to help parents/carers overcome perceived barriers to accessing nature-based experiences.

This toolkit was developed out of a research project which examined how parents/carers living across rural and urban locations felt about child-nature disconnection fears. We explored the barriers which parents/carers perceive as dampening opportunities for their children to connect with nature, and co-developed this toolkit as a response to them.

The toolkit will be physically printed and digitally accessible online. It comes with a downloadable certificate of engagement, and an audio-recorded version.

Examples of activities:
Where is nature: In the Home
Where is nature: Outside
My Nature Diary
Nature Activity Ideas for Different locations
Nature Activity Instructions

Website: [https://ysjournal.com/about/](https://ysjournal.com/about/)
Big Research questions and real-world research to understand science in schools

Leading organisation:
The Association for Science Education – ASE UK

Target audience:
Research-focused Teaching resources to inspire students in STEM Careers’

Format:
Whilst using these activities teachers may wish to show students the original research paper

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<td>APPRENTICESHIP WITH A RESEARCH EXPERT, STEAM IN REAL LIFE</td>
<td>HEALTH, CLIMATE AND ENVIRONMENT, SCIENTIFIC THINKING</td>
<td>RESEARCH AND DATA SCIENCE</td>
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Research is an integral part of science. Big Research Questions (BRQ) offers resources to embed real world research in the classroom so that students gain a better understanding of how science works.

BRQ Inspires students in STEM Careers with real problems, researcher, and scientists

**EXAMPLES**

**Macaques and Malaria - The spread of disease**

What research are scientists doing to help prevent the spread of this deadly disease? How is malaria normally transmitted to humans?

**Visualising the Invisible**

How can hand touch data help to reduce healthcare associated infections?

**Protecting Communities in Africa from Pneumococcus**

How could you test the effectiveness of pneumococcal vaccines for community protection?

Whilst using these activities students can access the original research paper and use this to illustrate how scientists share their research and discuss the need for peer review before publication.

This supports coverage of Working Scientifically (England).

1. Working Scientifically
2. illustrate how scientists share their research
3. discuss the need for peer review before publication

Website: [https://www.ase.org.uk/resources/big-research-questions#](https://www.ase.org.uk/resources/big-research-questions#)
INITIATIVE 27  
CCS resources to understand nature and how to build a more sustainable future

Leading organisation:  
RSC – Royal society of Chemistry

Target audience:  
Students, 11 – 18 years old

Format:  
lesson plans, experiments, and activities

Green Skills

CARE  
KNOW  
DO

CLIMATE CHANGE  
CRITICAL THINKING  
PROBLEM-SOLVING

DECARBONISATION  
SYSTEMS THINKING  
COMMUNICATION

Develop your students’ understanding of the greenhouse effect, and investigate the chemistry behind efforts to reduce or capture greenhouse gases in the atmosphere

Based on the UN’s sustainable development goals, the Sustainability in chemistry series brings together tips, ideas and curriculum-linked resources to connect your existing chemistry lessons with sustainability.

Examples:
Resource Spot the entropy errors worksheet | 16–18 years

Resource Displacement reaction snap | 11–14 years
Resource Hanukkah doughnuts: interpreting practical instructions | 11–14 years

Use this demonstration to illustrate the greenhouse effect and the role of carbon dioxide as a greenhouse gas. Includes kit list and safety instructions.

Reinforce your students’ understanding of the cause of the greenhouse effect using this lesson plan with a demonstration and activities for 16–18-year-olds.

Website:  https://edu.rsc.org/resources/collections/climate-change-and-sustainability
MEI Maths: engaging learners with maths, climate change and meteorology

Leading organisation: RMetS Royal Meteorological Society

Target audience: schools

Format: teaching and learning resources including a Tool for Professional Development

Green Skills

CARE
DIGITAL RESEARCH
DATA SCIENCE
APPRENTICESHIP &

KNOW
PROBLEM-SOLVING
SYSTEMS THINKING

DO
PROJECT
MANAGEMENT/RRI
DIGITAL RESEARCH AND

MEI supports teachers in making the most effective use of tools in the classroom by providing access to free or low-cost professional development and resources.

The resources aim to empower students to understand information and data,

The resources also highlight how maths skills can be used to examine and evaluate issues and draw evidence-based conclusions.

The first set of resources, released this week, concentrates on trees and their role in carbon capture and storage.

The Trees for Net Zero resources are designed to be delivered over one or two lessons, looking at the topic in depth.

The Trees and Carbon Capture resources provide standalone activities that can be delivered as part of a lesson.

See also Electric Vehicles and the other on Extreme Weather.

Session notes, presentations, and printable sheets for students.

students have access to relevant technology throughout their study of maths.

Website: https://mei.org.uk/rmets-and-mei-climate-change-resources/
The Royal Society of Biology: recommendations and framework

**Leading organisation:** Royal Society of Biology

**Target audience:** Secondary Schools

**Format:** Curriculum specification, resources, articles and recommendations

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<td>GROWTH MINDSET</td>
<td>DECISION MAKING TEAMWORK</td>
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RSB offers a cohesive approach to biology education and influencing policy makers, curriculum designers and specification designers across the UK.

The summary for policy makers is an introduction to the RSB's organisational curriculum framework and eight recommendations to raise the standards of school biology. It is intended to be used to inform future curriculum policy, guidance, and content.

Access the links to explore an overview of the three dimensions, seven big-questions and 23 themes and the eight recommendations to raise the standards across the school biology curriculum as set out in Evolving 5-19 Biology.

Framing the secondary science curriculum alongside articles from the Institute of Physics and Royal Society of Chemistry who are undertaking similar work.

The RSB’s article Developing a framework for the biology curriculum reflects on their approach, and the rationale behind some of the decisions made mapping a coherent curriculum for biology.

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**INITIATIVE 30**

**Tomorrow’s Climate Scientists: addressing climate and biodiversity issues**

**Leading organisation:**
The Royal Society

**Target audience:**
Schools

**Format:**
Online information, events
Grants, schemes, and awards
Topics and policy

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**The 2022 funding round is now open for applications. Please note applications for the Tomorrow’s climate scientist’s extension are completed through the main Partnership Grants application form.**

To help teachers and STEM partners with the application, free online training sessions and drop-in applicant support sessions are being run.

- A chance for students to have a voice in the direction of scientific research by working with their STEM partner.
- Supports students to develop green skills as the UK moves towards a net zero future.
- Additional opportunities for schools, including producing short films about their projects and sharing their work with the media.
- Applications are completed through the main Partnership Grant application process. Full details can be found here.
- There must be two partners involved – a school partner from the UK and a STEM partner from academia or industry.
- Full eligibility and judging criteria can be found here.

**Website:**  [https://royalsociety.org/grants-schemes-awards/grants/partnership-grants/tomorrows-climate-scientists/](https://royalsociety.org/grants-schemes-awards/grants/partnership-grants/tomorrows-climate-scientists/)
INITIATIVE 31

Climate friendly: helps schools to learn about and engage with climate action

Leading organisation:
Climate Friendly Schools.

Target audience:
Primary and Secondary Schools

Format:
Online Guidelines, resources action plan and communications activities

Forest
Green Skills
CARE
CLIMATE CHANGE RESILIENCE
REIMAGINING GREEN

KNOW
CLIMATE CHANGE, DECARBONISATION, CIRCULAR ECONOMY

DO
NETWORKING MULTI-GOVERNANCE TO MANAGE CHANGE

Climate Friendly offers a programme with 5 steps for schools to become climate friendly:

=> Climate Friendly Action Team
Tackling the climate emergency is a daunting task, so friends and colleagues together can establish a Climate Friendly Action Team.

=> Climate Friendly Audit
In order to establish how climate friendly, schools need to complete an audit of current attributes and attitudes.

Schools can then create an audit for each of the Climate Friendly Themes: Building, Energy, Food, Grounds, Water, Transport and Consumption.

Complete the audits and then use our Climate Friendly Action Plan Template to organise your next steps towards climate success.

=> Climate Friendly School Status
Become a ‘Climate Friendly School’, join the tide on climate change, and contribute to ensure that similar mistakes aren’t made in the future.

Website: https://www.climatefriendlyschools.org.uk/
Eco-Schools: uniting young people to create positive impacts for our planet now.

Leading organisation: Eco-Schools Charity Company

Target audience: Schools

Format: Online information, resources, and activities

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ECO-SCHOOLS aims to empower young people to make a difference in their school, local community and beyond.

It offers more manageable and directed themes that prompt young people to consider environmental changes that they can make in their school and everyday lives.

ECO-SCHOOLS teach young people the skills and knowledge needed to benefit and improve our planet throughout their lifetimes.

ECO-SCHOOLS’ programme provides a simple, seven-step framework to empower young people to make a difference in their school, this also includes their local community, that means beyond early years, primary or secondary pathways for sustainability to improve our planet.

Ten topics
- Biodiversity
- Energy
- Global Citizenship
- Healthy Living
- Litter
- Marine
- School Grounds
- Transport
- Waste
- Water

Their activities include:
- Eco-Club
- Eco-committee
- Eco-Warriors group
- Eco-Team

Website: https://www.eco-schools.org.uk/
Founders4Schools: reduce the skills gap with inspirational careers education

**Leading organisation:**
Founders4Schools

**Target audience:**
Young people under the age of 25

**Format:**
Online information, Role models, Meetings Projects

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Founders4Schools (F4S) considers that work experiences can be a catalyst for change for young people who may have limited networks or come from workless households.

F4S focuses on underserved young people with limited networks who are even more reliant on schools for careers guidance and experiences of work, yet school provision remains patchy and inconsistent.

Aspirations are strongly correlated to knowing someone who works in a related job, and work experiences are a powerful catalyst for change in young people.

Yet access to those opportunities is dependent on where young people live, their school, and their personal connections.

F4S inspires students, opening their eyes to possible career paths to prepare them for the rapidly changing world of work and increase their employability.

Students participate in role model encounters in the classroom or virtually.

Geographical location does not limit their access to a diverse network of business.

**Website:** [https://www.founders4schools.org.uk/educators/f4sevents/](https://www.founders4schools.org.uk/educators/f4sevents/)
OAK Garden Network: growing curiosity for a sustainable world

Leading organisation: OAK GARDEN

Target audience: schools

Format: resources Discussion, campaigns

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<td>DIGITAL RESEARCH DATA ANALYSIS</td>
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Oak Garden empowers schools to reduce their carbon emissions through electricity optimisation and sustainability education. Young people are currently experiencing climate anxiety, with little knowledge of what actions they can take.

Oak Garden are dedicated to cutting the carbon emissions of schools and facilitating the green education of the next generation. They provide an electricity management service, working with schools to reduce electricity bills and emissions. Through cutting-edge sensor technology and data analysis, they can identify savings of up to 20%.

Oak Garden helps students with the knowledge and understanding of how they can make a difference.

School management is given access to the OAK Insights platform, where they can explore their electricity data and find recommendations for how to cut their emissions. Students learn that being outdoors and relying less on energy being consumed indoors is one way they can take action in the climate crisis.

Use cutting edge technology, personalised insights, and practical recommendations to reduce bills and carbon footprints.

Put climate change at the heart of education. Be a part of this vital mission to reach carbon zero.

Reduce waste and give every penny saved back to the schools for them to reinvest in their students’ future.

The Garden box offers a packed full of resources for teachers to bring sustainability education to the classroom and to the great outdoors.

Website: [https://oakgarden.org](https://oakgarden.org)
PBLworks: Project Based Learning for Black and Brown students’ achievement

**Leading organisation:** PBLworks in partnership with Marin Promise, Target audience: K-12 teachers and school leaders

**Format:** online learning platform MyPBLWorks with 70+ standards-aligned project units, rubric templates and strategy guides

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<tr>
<td>DIVERSITY-INCLUSION</td>
<td>TEAMWORK: PBLworks supports teachers with knowledge and skills for them to design and facilitate quality Project Based Learning.</td>
<td>CRITICAL THINKING: Create capacity to support research and evidence prioritie, including growth and sustainability.</td>
<td>SUSTAINING STRONG COMMUNITIES: PBLWorks offers a variety of PBL workshops, courses, and services for teachers, school leaders, and coaches. It builds the capacity of school and system leaders to set the conditions for teachers to implement great projects with all students.</td>
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PBLworks is about designing and implementing powerful projects with students. Its aims are to:

- share the vision of racial equity for all students.
- inspire students to think differently as learners, collaborators, and leaders.
- prepare students for college, career, and life.
- lead students to master academic content & skills.
- advance educational equity.
- enable teachers to make a difference in their students’ lives.

Website: [https://www.pblworks.org/](https://www.pblworks.org/)
The Chase School Climate Emergency

Leading organisation: The Chase school

Target audience: Parents, Staff, Pupils (plus the wider school community)

Format: School Website

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Our established group meet regularly to plan events and actions that improve the school’s awareness of climate change, and empower students and staff to help make a difference: we are getting on top of recycling, single-use plastics, energy and water waste, sustainable food and transport, an increase in solar panels, and planting more trees on site.

Pupils are faced with the senseless, existential threat of climate breakdown. This decade is our make-or-break opportunity to limit warming to 1.5°C and steer the world toward a net-zero future.

Sustainable education needs to be a core priority in planning and delivering lessons, approaches to resources, modelled behaviour, and attitudes to school life.

Staff need to feel motivated and impassioned to act - developing these shared sets of beliefs will lead to much-needed changes in behaviour. Teachers are time-poor, and understandably focus their time and energy on school and government priorities.

We, therefore, need to make sustainability a core focus within curriculum planning to ensure continual involvement and action from everyone.

We can reach all pupils and tackle the issue holistically by ensuring that the teaching of the climate crisis, living sustainably, and connecting with our natural environment is at the heart of everything we teach.

As a school, we have included more explicit links to these issues within lessons, ensuring it is featured on our Departmental Improvement Plans to add a level of accountability.

I very much see the embedding of sustainability as an enriching and cohesive tool that unites many aspects of school life.

Website: [https://www.chase.worcs.sch.uk/](https://www.chase.worcs.sch.uk/)
Twinkl: climate change resources related to COP26 and COP27

Leading organisation:
Twinkl - Specialist Digital Educational Publisher
Sheffield, England

Target audience:
Schools and Parents
Early Childhood (PreK)
Elementary (1st – 5th)
Middle (6th – 8th)

Format:
Lesson plans, schemes of work, assessment, interactive activities, resource packs, PowerPoints, teaching ideas

Green Skills

CARE
LOCAL SUSTAINABILITY SUPPORT, RESPECT FOR LIFE & ENVIRONMENT

KNOW
CLIMATE CHANGE SYSTEMS AND CRITICAL THINKING

DO
SOCIO-SCIENTIFIC ARGUMENTATION

Twinkl brings sustainability into school life with ‘5 Cs’:
1. Culture: promote and support sustainable behaviour.
2. Curriculum: learn about the environment and the actions they can take.
3. Campus: support nature and keep the school’s carbon footprint low.
4. Community: help to facilitate change in the wider community.

An example of resource focused on “Our Climate, Our Future” which is a PowerPoint to introduce students to climate change and COP27

Students take an active role and are invited to
• Write to Persuade: Lesson Pack to support students to write to their MP.
• Innovate for the Future: worksheets to support students to explore solutions to some of the big issues the world is currently facing.
• Contribute to the School Promise to the Planet

Website: https://www.twinkl.co.uk/resource/cop26-school-action-bundle-t-sc-1628113571
Primary Resources: materials for pupils, teachers, and parents to think scientifically

Leading organisation: RM – Educational technology for schools and trusts across the UK

Target audience: Primary school students with teachers and/or families

Format: Online resources
See also: http://www.primaryresources.co.uk

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Primary Resources website offers free lesson plans, activity ideas and resources for primary teachers
It includes engaging exercises and fair Experiments

The learning materials linked to the curriculum programme include knowledge and skills related to General Science.
Some of the key online resources available on the website are:

- Life Processes and Living Things
- Scientific Enquiry
- Materials and their Properties
- Physical Processes

The activities to be developed in the school supported by teachers and families are:

- Worksheets and lesson plans
- Class Assembly

Website: https://www.primaryresources.co.uk
ALDERSGATE group
Politically impartial, multi-stakeholder alliance is championing a competitive and environmentally sustainable economy.

A key objective for the Group is to ensure that climate and environmental policy can result in positive impacts in terms of supply chain growth, significant job creation and investment in skills across the country.

Green Skills

**CARE**
EQUITY-EQUALITY
STEAM IN REAL-LIFE
SUSTAINING

**KNOW**
CLIMATE CHANGE
SYSTEM THINKING

**DO**
SOCIO-SCIENTIFIC
ARGUMENTATION
COMMUNICATION

The Aldersgate Group launched a new report arguing that the decarbonisation of the UK’s heavy industrial and manufacturing sectors could drive the growth of low carbon industrial supply chains in the UK, increase these sectors’ contribution to the economy, and make UK industry more resilient to global economic shocks and supply chain disruptions.

Link:

They develop independent policy solutions based on targeted research, sound evidence and the extensive expertise of our members.

Link:
https://www.aldersgategroup.org.uk/upcoming-events/

Website: https://www.aldersgategroup.org.uk/
### Initiative 40

**Ground Source Heat Pump Association: teaching scheme of work**

**Leading organisation:**
Ground Source Heat Pump Association

**Target audience:**
Education authorities, subject leaders and teachers

**Format:**
Training courses

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‘Ground Source Heat Pump Association’ - GSHPA’s long term commitment to sustainability and preventing climate change offers Schemes of Work which teachers in primary and secondary schools may download as ‘off the shelf’ teaching packs.

As a trade association the GSHPA brings together over 160 members and interested parties from across the heat pump installation industry to develop a strong, dynamic and sustainable environment for heating and cooling systems that are based on heat capture, heat storage and heat transfer, including heat sharing networks and demand side management.

GSHPA provides training courses for education authorities, schools, subject leaders and teachers.

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Website [https://gshp.org.uk/education-and-training](https://gshp.org.uk/education-and-training)
Caplor Energy starting its renewables journey in 2007. First installing a range of energy solutions on the farm is considered one of the first renewable energy firms to be established focused on urgent solutions to the climate crisis, which has developed into a growing and more national advocacy role.

Caplor contributed to the local rural economy since 1923, focused on the effects of climate change on the environment.

The team at Caplor Energy are passionate advocates of renewable energy, with a mission to inspire businesses, communities and homeowners to install renewable energy systems to deliver a zero carbon future that will conserve and enhance the long term social and environmental future of our planet.

Caplor offers support to all our customers through knowledgeable, unbiased advice, quality products and reliable service in our quest for a greener, more sustainable economy that will provide a better environment for our future generations.

Website:  https://caplor.co.uk/
Green-building-advisory-committee: together for a better-built environment

**Leading organisation:**
UK Green Building Council

**Target audience:**
Future leaders, business leaders, industry stakeholders

**Format:**
Projects, training programmes

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**Net Zero Whole Life Carbon Roadmap**

UKGBC have launched the Whole Life Carbon Roadmap, a common vision and agreed actions for achieving net zero carbon in the construction, operation and demolition of buildings and infrastructure.

**It proposes to radically improve the sustainability of the built environment, by transforming the way it is planned, designed, constructed, maintained, repurposed, and operated.**

**Examples of activities offered:**

- Change Accelerator
- Social Value Programme
- Virtual Learning Portfolio
- Bespoke Learning
- Social value training

**Website:** [https://www.ukgbc.org/](https://www.ukgbc.org/)
Biobec.eu: leveraging Education to unlock the EU bioeconomy’s full potential

Leading organisation:
Biobec.eu

Target audience:
Public bodies, regions and bioregions, industrial clusters and educational providers, multipliers, NGOs and associations of primary producers, others

Format:
Projects

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BIObec aims to build bridges between the bio-based industry and the education system by interlinking universities, innovation labs, and R&D centres with industrial actors and regions.

Impacts:
• Impulse the creation of other programmes of education and collaboration.
• Boost bioeconomy education at international level.
• Contribute to enhance a more sustainable and circular society.
• Unlock the full potential and competitiveness of the EU bioeconomy.

BIObec will establish the framework for the development of multi-level Bio-Based Education Centres (BBECs) to act as knowledge hubs bridging the gaps between academic institutions, students, innovation entities and policy makers. Likewise, the BBECs will be flexible enough to answer the actual and future needs of the industry and surrounding ecosystem at local, regional and national levels.

Website:  https://biobec.eu/project/
**EDBioEC Projects: innovative education for the bioeconomy**

**Leading organisation:**
Maynooth University

**Target audience:**
Undergraduate, Master’s and PhD students

**Format:**
Higher education and postgraduate programmes

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Education on the bioeconomy including bio-based sectors for young people in primary and secondary education in Europe

The University’s research institutes and centres consolidate and deliver this impact as vibrant communities of learning, discovery, and creation. Research at Maynooth also is very much central to its teaching, and the University prides itself on placing equal value on its research and teaching missions.

Maynooth offers a range of programmes at undergraduate, Master’s and PhD level in the humanities, science and engineering, and social sciences, including business, law, and education. The University also offers a range of international programmes and partnerships.

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Website: [https://www.maynoothuniversity.ie/research/research-news-events/latest-news/innovative-education-bioeconomy](https://www.maynoothuniversity.ie/research/research-news-events/latest-news/innovative-education-bioeconomy)
Climate psychology is concerned with the emotions, and the social and mental processes that have contributed to the ecological and climate crisis, and our responses and processes of adaptation to it.

The Climate Psychology Alliance draws on psychotherapeutic approaches, psychosocial studies, the arts, spiritual and philosophical thought, literature, systems thinking and ecopsychology, all in the service of unpicking our collective and individual responses to the crisis, much of which is unacknowledged and unconscious.

- Build understanding and support for individuals and groups
- Enable transformation and adaptation
- Help learners to cope with the consequences of the climate and ecological crisis.

Website: [https://www.climatepsychologyalliance.org/](https://www.climatepsychologyalliance.org/)
The Climate Education Gap: Majority of People Rushing to Make Up Ground in Their Climate Education

Green Skills

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Pearson offers academic and vocational qualifications that are globally recognised and benchmarked, with educational excellence rooted in names like Edexcel, BTEC, EDI and LCCI.

Pearson Qualifications will help students reach their goals, whether that means getting a job, progressing their career, or studying at a world-leading university.

The Pearson Global Learner Survey, a poll of 5,000 people in five countries, found that 58% of people globally say topics related to the environment were not adequately taught in school. Many now report turning to media outlets, social media, documentaries, and books as the top ways they are getting up to speed.

Pearson's Global Learner Survey is the leading poll of learners on education issues in the world, offering a deeper understanding of trends in education including Climate Change and providing key data to help further discussions on many important issues.

"When you know better, you do better. Globally, the majority of people are educating themselves to gain a deeper understanding of climate change and the positive impact they can have through their own actions and careers. Their hunger to learn what they missed in school about the environment is fuelling interest in green jobs and practices that can be incorporated into any role or industry, as well as personal actions we can all take that will ensure a sustainable future for our world."  

Erika Webb-Hughes, Pearson’s Vice President, Sustainability and West Coast Government Relations

POLICY MAKERS
ENGAGE: equipping the next generation for active engagement in science

Leading organisation: SHEFFIELD HALLAM UNIVERSITY UK

Target audience: Schools, universities, and local communities

Format: Online resources, activities and events
https://www.engagingscience.eu/en/

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ENGAGE aims to empower the next generation with skills for real-life, through problem-solving, fun gamification approaches and collective decision-making tools about socio-scientific issues.

Science Education plays an important role for responsible citizenship. Responsible Research and Innovation - RRI refers to the transparent interactive process by which citizens and innovators helping each other by sharing their informed-based opinions and ethical views about innovative products or innovation methods including their potential risks and benefits.

ENGAGE underpinned by RRI deals with uncertain areas of knowledge, where values and argument matter as much as facts. ENGAGE offers activities with socio-scientific issues that are relevant to society and meaningful for young people’s lives. It is also linked to the curriculum, so that students can use knowledge learned with teachers to make decisions with families at home and discuss these decisions with scientists.

Underpinned by the CARE-KNOW-DO framework, ENGAGE explores ‘How could citizens be equipped at an early age to discuss socio-scientific issues by applying science knowledge, ethical values, and inquiry skills?’

Open-ended Projects supported by open schooling put teachers and students into partnership with practising scientists, to learn about RRI directly.

Website: https://cordis.europa.eu/project/id/612269
## OSOS – Open Schooling for open societies

### Leading organisation:
ELLINOGERMANIKI AGOGI SCHOLI PANAGEA SAVVA AE
Greece

### Target audience:
School leaders, teachers, students and the local community

### Format:
https://www.openschools.eu
Online resources, activities and events

### Green Skills

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School leaders should set a vision for creating learning experiences that provide the right tools and supports for all learners to thrive.

OSOS was based on FIDS Feel (transform – Imagine – Create – Share) presented also by TreeHouse Innovation.

Students identified community problems (Feel), envision, and develop creative solutions that can be replicated easily (Imagine), implement the project (Create) and finally share their stories with other schools in the community (Share).

Teachers should be collaborators in learning, seeking new knowledge and constantly acquiring new skills alongside their students.

Leaders, teachers, students and the local community share responsibility and from which they all benefit through the increase of their communities’ science capital and the development of responsible citizenship.

Focus on areas of science linked with the Grand Societal Challenges.

**EXAMPLE:**
Islands diversity for science education: science trail created by the students, open to the local community and visitors, where the major challenges and proposed solutions are presented in an interactive science tour Water4life.

Website: [https://cordis.europa.eu/project/id/741572](https://cordis.europa.eu/project/id/741572)
SEAS: Science education for action and engagement towards sustainability

Leading organisation: UNIVERSITY OF OSLO
Norway

Target audience: School leaders, teachers, students and the local community

Format: https://www.seas.uio.no/
Online resources, activities and events

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**STEAM IN REAL-LIFE**

SEAS offers tools and methods that facilitate collaboration between schools and local communities facing sustainability challenges.

- **Challenge** a tool to engage with sustainability challenges.
- **SenseMaker** a tool to capture pictures, recordings and writings from large groups of people.
- **LORET tool** a tool to support the generation of materials for sustainable development learning projects.
- **International database for educational materials and lesson plans.**

Collaborations involves total of 39 schools, 3956 students, 176 teachers, and 186 out-of-school organisations.

**CONTRIBUTE TO THE DEVELOPMENT OF MODELS AND EXPERIENCES TO INTEGRATE SCIENCE EDUCATION INSIDE AND OUTSIDE SCHOOL.**

Example: Confronting Ocean Plastics

Students will be research, confront, and explore paths of individual and community action in the context of the wicked problem of ocean plastics, using a variety of disciplinary and action-oriented pedagogical approaches.

Students will explore ocean plastics and climate, ecological, and social crises, using chemistry, biology, geography, Norwegian language (the mother tongue), English language, and social sciences.

Students will visit local businesses and think tanks working on related issues, including a local plastics factory and a group working on a local transition towards circular economy; e.g., life cycle analysis of a local business and public fair:

1) making scientific posters about ocean plastics.
2) creating artworks.
3) creating small films
4) designing the larger structure of the exhibition.
5) community outreach, policy, industry, academia, the media, and civil society, and finally,
6) hosting and guiding through the exhibition.

Website: https://cordis.europa.eu/project/id/824522
**PHERECLOS: partnerships for pathways to Higher Education and Science**

**Leading organisation:**
KINDERBURO
UNIVERSITAT WIEN
GMBH
Austria

**Target audience:**
School leaders, teachers, students and the local community

**Format:**
https://www.phereclos.eu/
Online resources, activities, and events

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**Phereclos’ goal is to create six Local Education Clusters (LECs) to work as agents of innovation in education and play a fundamental role in advancing critical thought, decision-making, competitiveness and sustainable development among children and youth.**

This ecosystem will testify individual achievements with respect to STEAM engagement in formal or non-formal settings or even unintended learning outcomes.

**Phereclos brings together schools and academic actors to develop collaborative educational environments.**

The aim is to spread knowledge outside the academic environment with considerable profit for the society and the economy.

**Phereclos offers digital “OpenBadge” ecosystem which labels institutions as reliable and responsive actors and showcases all LEC parties to become real change agents in education.**

The regional effectiveness and impact will be monitored by academic transfer and implementation research and lead to the development of implementation guidelines and policy briefs to enhance the sustainability of the overall approach.

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Website: [https://cordis.europa.eu/project/id/824630](https://cordis.europa.eu/project/id/824630)
**OSHUB: Open Science Hub Network: empowering citizens through STEAM Education with Open Schooling**

**Leading organisation:**
UNIVERSITEIT LEIDEN
Netherlands

**Target audience:**
School leaders, teachers, students and the local community

**Format:**
https://oshub.network/
Online resources, activities and events

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OSHUB engages schools in tackling challenges faced by their local communities through collaborations among local enterprises, local schools' researchers, and social innovators.

Communities, including civil associations and families, will tackle local challenges using Inquiry-Based Science Education (IBSE) and Responsible Research and Innovation (RRI) concepts and principles.

OSHUB works with schools to bring science, technology, engineering, art and mathematics (STEAM) education to the communities, as a tool for their sustainable development.

Help schools become actively involved as agents for collaboration between civil society, enterprises, research institutes and community.

Overall, the main vision of OSHub is to inspire, empower and engage citizens - from school children to senior citizens - by working with schools to bring STEAM education to the communities, as a tool for their sustainable development.

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SALL: Schools as Living Labs

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SALL Engages in dialogue school communities, research institutions, science museums and centres and spaces of open-learning; together they will construct the living labs schooling methodology.

This new approach will be implemented and evaluated in the real-life system, demonstrating its ability to radically change the scene for science education programmes in European schools.

SALL aims to introduce the living labs methodology in schools as a novel technique for the development of open schooling activities linked to science learning.

The project engages in dialogue school communities, research institutions, science museums and centres and spaces of open learning; together they will construct the living labs schooling methodology.

SALL’s key actions are:

- a) co-construct the proposed living-lab-based open schooling methodology
- b) study, implement and evaluate the living-lab-based open schooling practices in real-life conditions
- c) support and sustain strong community-building, networking, dissemination, as well as policy-oriented interventions

Website: [https://cordis.europa.eu/project/id/871794](https://cordis.europa.eu/project/id/871794)
MOST (Meaningful Open Schooling Connects Schools To Communities) supports European school students and citizens in developing science knowledge, transversal skills and competences in working scientifically.

The project opens up formal science education and establishes partnerships between schools and their communities (families, science education providers, citizens, businesses, etc.) to work jointly on environmental school-community-projects (SCPs).

These participatory projects directly respond to the needs and values of those involved, benefit the communities as a whole and make schools agents of community well-being.

Develop science knowledge and competences by arranging partnerships between schools and their communities (families, businesses etc.)

MOST’s learning impact is boosted through an educational research-based approach that raises interest in science, scientific literacy, and environmental responsibility.

MOST will act to boost science on the local (schools) and regional (with 10 partner-countries) levels and by establishing an Open Schooling Network at the European level.

Website: https://cordis.europa.eu/project/id/871155
MAKE IT OPEN: inquiry-based Science education and the maker movement

Leading organisation:
Bloomfield Science Museum Jerusalem (BSMJ)
Israel

Target audience:
School leaders, teachers, students and the local community

Format:
https://makeitopen.eu/
Online resources, activities and events

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Make it Open brings the inquiry-based approaches of science education to meet the expansive philosophy and creative classroom approaches of the maker movement in an accessible and actionable framework.

It will offer tools for collaboration between formal, non-formal and informal educational providers, enterprise and civil society, and support schools in becoming agents of community well-being where families are encouraged to become real partners in the learning process.

Make it Open supports schools, teachers, educators, and students of all ages to make synergies between science, creativity, entrepreneurship, and innovation.

It promotes science education in schools by bringing together experts in maker education with enterprises and civil society organisations.

It engages open schooling hubs in 10 European countries, where young people from more than 150 schools work on solving community challenges.

It offers opportunities for participants to collaborate with enterprises and civil society organisations in order to run activities where children solve challenges in and with the community using tools and approaches from maker education.

Website https://cordis.europa.eu/project/id/872106
CONNECT: inclusive Open Schooling through engaging and future-oriented science

**Leading organisation:**
Exus software monoprosopi etairia periorismenis evthinis Greece and The Open University-UK

**Target audience:**
School leaders, teachers, students and the local community

**Format:**
https://www.connect-science.net/about-the-project/
Online resources, activities and events

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**CONNECT** is an inclusive, sustainable model for enabling more secondary schools to adopt open schooling by embedding science-action projects in the core curriculum, using fun participatory science and future-oriented approaches to engage students with real-life problem-solving with universities and enterprises.

**CONNECT** is underpinned by the **CARE-KNOW-DO FRAMEWORK** to help students benefit from learning experiences that meet their needs, is especially necessary today for secondary schools to prepare students for future careers.

**It focuses on 3 issues:**
Q1. How can open schooling increase the value and priority of partnership activities and reduce the barriers to entry so more schools are willing and able to adopt them?
Q2. How can open schooling facilitate the interaction between all partners (science professionals, teachers, students, and their families) to result in effective learning experiences linked to R&I?
Q3. How can open schooling make science careers more inclusive by giving disadvantaged students more experience and insight into professional STEM jobs, supported by professionals and their families?

**CONNECT offers an inclusive, sustainable model to facilitate the adoption of open schooling by a large number of secondary schools through implementing science-action gamification projects in the core curriculum.**

It offers open scenarios and structured curriculum material, all linked to the sustainable development goals.

**Website:** [https://cordis.europa.eu/project/id/872814](https://cordis.europa.eu/project/id/872814)
COSMOS: Creating Organisational Structures for Meaningful Science Education

**Leading organisation:**
UNIVERSITEIT UTRECHT
Netherlands

**Target audience:**
School leaders, teachers, students and the local community

**Format:**
https://www.cosmosproject.eu/
Online resources, activities and events

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COSMOS aims are to:
- Create new partnerships within communities that can foster science education for all citizens.
- Encourage an 'outwards' mode of engagement between schools and communities.

COSMOS promotes open schools from an 'inwards' to an 'outwards' mode of engagement in, with and for their communities.

It combines key pivotal elements of innovative constructivist pedagogy, teacher education, and transforming school organisational culture.

It works closely with science teachers, providing opportunities for professional development and capacity building.

The COSMOS consortium (12 partners, 7 countries) provides transdisciplinary cooperation and expertise in non-formal and formal science education, science teacher education, educational organisation and leadership, and strong societal links within communities, all of which warrant the successful implementation of COSMOS.

The resulting tools, policy briefs and roadmaps will be used by schools across Europe further impacting communities through science education.

Website:  https://cordis.europa.eu/project/id/101005982
**INITIATIVE 57**

Multiplayers’ partnerships to ensure meaningful engagement with science and research

**Leading organisation:**
RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITAT BONN Germany

**Target audience:**
School leaders, teachers, students and the local community

**Format:**
https://multipliers-project.org/
Online resources, activities, and events

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MULTIPLIERS aims to facilitate the transition of schools into innovative and open collectors of new ideas, practices, scientific approaches, able to offer to the communities in which they are embedded a space for open, inclusive, and inquiry-based learning on science issues which have an impact on citizens’ lives.

Establish Open Science Communities – partnerships between schools, families, civil society organisations, informal education providers, policymakers, the media, and a vast range of science institutions in six EU Member States.

Develop science projects with real-life challenges as starting points to be implemented in schools.

To ensure the results’ transferability and uptake, final recommendations, guidelines, and learning materials will be published in a multilingual open webspace; OSCs will be maintained and enlarged after the end of the project to further pursue the MULTIPLIERS open schooling process.

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Website:  [https://cordis.europa.eu/project/id/101006255](https://cordis.europa.eu/project/id/101006255)
PFASE: Partnerships for Science Education

Leading organisation:
Universidade Nova de Lisboa, Portugal

Target audience:
School leaders, teachers, students, and the local community

Format:
https://pafse.eu/
Online resources, activities, and events

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Pfase engages schools, universities, enterprises, and non-formal education providers in building science clusters that boost young people’s awareness of public health challenges, protective factors and patterns of risky behaviour, and the role they can play in their community preparedness.

Its aim is to contribute to students’ and citizens’ literacy concerning public health threats that need to be approached by concerted action, with a focus on epidemics.

Challenges such as child obesity, chronic illness, climate change and vaccine hesitancy will be included in the educational provisions.

PAFSE will strengthen populations’ literacy and mitigate risks, having students play a central role as public health ambassadors, early adopters, and spreaders of scientific knowledge.

Pfase offers activities for participants to strengthen populations’ literacy and mitigate risks, having students play a central role as public health ambassadors, early adopters, and spreaders of scientific knowledge.

Website: https://cordis.europa.eu/project/id/101006468
ICSE Science Factory

INITIATIVE 59

Leading organisation: Padagogische Hochschule Freiburg

Target audience: Schools, communities, enterprises and other institutions.

Format: Online Information, Reports and Articles

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ICSE promotes new high-capacity cross-sectoral partnerships in five partner countries consisting of science researchers, science education researchers and non-formal education providers, supported by attached schools, enterprises, and community institutions.

It supports participants with real-life problem-solving on issues relevant to society (including decision-making), and the concept of challenge-driven innovation, which integrates communities in overcoming challenges.

ICSE offers science labs in each country, a threefold system for encouraging mentoring across the partnership and a systematic approach to quality assurance by using design research, which strives for solutions tailored to local communities based on a joint European concept.

ICSE offers:
1. local partnership conventions, where they share and apply research findings, and local public fairs to integrate communities in the scientific learning process.
2. collaborative and interdisciplinary lighthouse activities and open schooling activities for community members (on health, digitalisation, Green Deal), supported by mentoring.
3. interactive career talks, focussing especially but not only on female role models in science and on overcoming stereotypes.

Website: https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/how-to-participate/org-details/999999999/project/101093387/program/43108390/details
LEVERS: LEarning VEntuReS for Climate Justice

Leading organisation: TRINITY COLLEGE DUBLIN (IRELAND)

Target audience: Schools, Communities and Professional partners

Format: Online Information, Reports and Articles

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In nine Learning Venture demonstrator regions, stakeholders from formal, non-formal and informal education across education levels, community organisations, research and innovation, industry, and government, will be supported to adopt a systemic design approach to create climate justice projects offering meaningful real-world learning experiences.

Capacity building and a mentoring programme will offer role models and guidance within and between regional Learning Ventures, linking R&I with education.

The LEVERS Learning Framework and Field Guide will enable the partnership model to be adapted for other regions and challenges. Professional learning programmes and Open Schooling resources will enable widespread uptake from youth and adult educators. Guides for industry engagement, business models and policy recommendations will ensure transformative impact on science education in Europe into the future.

Website: https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/how-to-participate/org-details/999999999/project/101094825/program/43108390/details
The STE(A)M Learning Ecologies (SLEs) project will develop engaging open schooling-enabled science learning paths for all in learning continuums of formal and informal learning environments and enterprises by emphasising inclusiveness.

1. give all actors space and motivation to take initiative and central roles.
2. create comprehensive partnerships in the form of interconnected knowledge ecosystems, in local communities able to foster improved science education for all citizens.
3. make the evidence about the benefits of open schooling a driving force in European and national policymaking.

The proposed project is introducing the powerful concept of “learning ecologies” as a vehicle for envisaging and realising impactful local open schooling partnerships as science learning continuums for all.

Website: https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/how-to-participate/org-details/999999999/project/101094648/program/43108390/details
Final Remarks
This report presented 60 green initiatives, 33 skills for students to develop their competences for green careers, green life, and green society, and 7 recommendations for policy makers to support the Climate Change and Sustainability movement with networks, open schooling, and CARE-KNOW-framework towards learning ecologies.

As with all arguments based on normativity, there is a danger that a New Education Movement based on climate change and related crises could provoke resistance, a desire to defend one’s current position and privileges for as long as possible.

This might also be seen as an intergenerational issue and is the inverse of the historical idea that children should enjoy better prospects and lifestyles than their parents. Most of today’s students face a future that looks increasingly bleak.
Here, we suggest that the ‘DO’ component of the framework is the way forward. Students need to be supported in taking action, even when such actions conflict with traditional school behaviour, such as climate strikes or demonstrations.

Students need respect, whether this is from teachers, politicians, or peers. Action breeds respect, so long as it is embedded in an ethical framework and justified by knowledge.

The three components of the framework CARE-KNOW-DO towards learning ecologies to enhance students’ connections with science (Figure 11) are thus mutually supportive and equally essential for sustainability.

Figure 11. CARE-KNOW-DO (for independent thinkers Okada, 2023)
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Paterson, F.; Baranova, P.; Gallotta, B. Towards a conceptual framework of enterprise support for pro-environmental small and medium-sized enterprises: A contextualised review of diverse knowledge domains. Local Econ. 2022, 37, 142–168.


Acknowledgements

We are grateful to all members of the Green Forum Network and to the Expert Advisory Members of CONNECT project, https://www.connect-science.net/ who contributed with peer-review.

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