

# Climate & Sustainability Education Initial Teacher Education

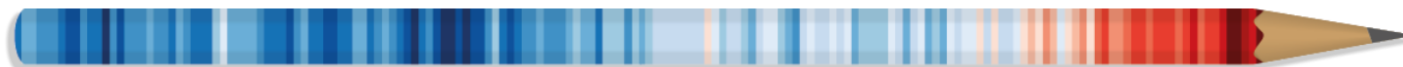


UCET 14-16 November 2023

**Jo Anna Reed Johnson**

Institute of Education

University of Reading



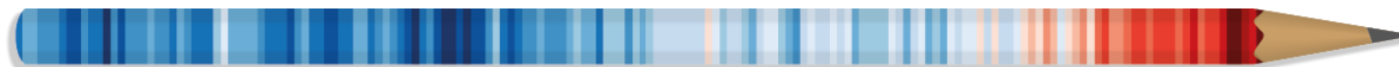
# EMPOWERING TRAINEE TEACHERS

We've developed a framework for initial teacher training, so that all trainee teachers in the UK have the knowledge, skills and confidence to effectively incorporate climate education within their teaching – across all levels and subjects. Informed by our expertise in teacher training and how young people learn, we are driving action to ensure that the next generation of teachers can transform climate education.


[reading.ac.uk/planet/climate-education/initial-teacher-education](https://reading.ac.uk/planet/climate-education/initial-teacher-education)



We have developed a Climate Education and Sustainability Initial Teacher Education (ITE) Framework for providers of teacher training to enable trainee teachers to develop their knowledge, understanding and skills related to climate change. The Framework supports student teachers to graduate with a core set of competencies to support young people to build resilience and become future change-makers in the climate and sustainability landscape.





A photograph of three children looking at a wooden bee hotel. The boy on the left is wearing a dark hoodie and is looking intently at the structure. The girl in the foreground has blonde hair and is wearing a yellow fuzzy hat. The child on the right is wearing a blue raincoat with a star pattern and is pointing at the bee hotel. The bee hotel is made of light-colored wood and contains several compartments with different types of holes and tubes for bees. A yellow ribbon with a bee pattern is tied around the middle of the structure. The background shows a grassy area and a wooden bench.

We led the development of a National Climate Education Action Plan which has been highlighted in the Department for Education's Sustainability and Climate Change Strategy. We are leading change for the next generation, working with the UK government's DfE and others to improve climate education for eight- to 18-year-olds in schools and colleges.

[reading.ac.uk/climate-education-plan](https://reading.ac.uk/climate-education-plan)

# NATIONAL CLIMATE EDUCATION ACTION PLAN



# National Climate Education Action Plan (Network Driving Change)



## National Climate Education Action Plan

1. Everyone involved in the education of children in school and college settings should be encouraged and supported to access accredited continuing professional development (CPD) to improve their personal understanding of up-to-date data and science of our changing climate and the impacts of these changes.
2. All teacher trainers and initial teacher trainees should be able to access training that empowers them to effectively incorporate climate education within their teaching across all levels and subjects.
3. Teachers and school leaders should be encouraged and empowered, both at a national and local level, to ensure time and space within and beyond the teaching day is included for climate education.
4. Every school and college should identify a senior staff member to lead on climate education and provide them with support and funding.
5. A structured programme or climate award for schools, colleges and youth organisations should be developed, providing a national focus to a range of extra-curricular activities and supporting resources to aid delivery.
6. A national scheme of quality assurance of teaching resources for climate education should be developed.
7. A regular national meeting of the dynamic, well-supported national networks of educators, scientists and young people should be held, to share ideas and promote collaboration among representatives of these groups.
8. Professionals working in climate research and policy, from science and non-science disciplines, should pledge a proportion of their working time to providing help to teacher-led climate education initiatives.
9. A national, guiding framework for all educational providers that outlines compulsory climate education for all young people via schools and colleges should be developed and implemented.

Read full details of the [National Climate Education Action Plan](#) (PDF, 530KB)

2. All teacher trainers and initial teacher trainees should be able to access training that empowers them to effectively incorporate climate education within their teaching across all levels and subjects.

[National Action Plan](#)  
[MOCK COP and COP 26](#)

Led by Professor Andrew Charlton-Perez, Professor of Meteorology and Head of School



# Climate Education Action Plan

Working in partnership to tackle the defining crisis of our generation



## Institute of Education Vision (HOS June 2022)

We believe that as an Institute of Education we have a moral and ethical obligation to be leading the work in this area. This is why, I have highlighted this work as a key area for the IoE.



# Initial Teacher Education

Empowering student teachers to incorporate climate and sustainability education with confidence



**Empowering trainee teachers**

# STAGE 1: Design of Framework

## CREATED A FRAMEWORK

**Aims and learning outcomes**  
Adapted from Thew et al. (2021)

Knowledge	Attitudes, values and behaviours	Competences and capabilities
<p>The causes and consequences of climate change (IPCC, 2021a, 2021b, 2021c).</p> <p>Climate change's consequences on a local and global scale, with an emphasis on different aspects of the problem having different levels of confidence and certainty, e.g. it is much easier to say things at global level rather than local.</p> <p>How does climate change link with other aspects of sustainability?</p> <p>What solutions are available and what are the implications of choosing between these solutions for social and environmental justice?</p> <p>Furthermore, what understanding of the mitigation and adaptation will be required because of climate change?</p> <p>We can do something about it now but we also will need to adapt to a different climate; some of the change is here and some will happen yet. (Thew et al., 2021).</p>	<p>To develop affective and behavioural skills that enable engagement with climate change and its impacts, i.e. approaches that cultivate integrated knowledge and global citizenship, while preparing students for curious, well-informed, big-hearted lives' (UNESCO, 2017).</p> <p>This should showcase examples of, and provide opportunities for, behavioural change as UK Higher Education institutions can facilitate the process of ensuring knowledge, values and affective responses translate to action (Thew et al., 2021, p. 3).</p> <p>Share BERA Manifesto for education and environmental sustainability to further enhance shared values for education and sustainability (BERA, 2021; Dunlop et al. 2022).</p>	<p>Enabling the learner to act and work with others to solve problems.</p> <p>Developing systems thinking, strategic thinking, collaborative competency, critical thinking, self-awareness and integrated problem-solving (Ojala, 2016).</p> <p>Supporting learners to critically engage with new information as it emerges and assess trusted sources – how do I know that climate information and projections are realistic, and what level of confidence should I attach? (Thew et al., 2021).</p> <p>Building eco-capabilities (Walshe, Moula, &amp; Lee, 2022) to support wellbeing and live sustainable lives.</p> <p>Capabilities such as 'knowledge for action, data literacy, creativity' etc are needed to enact these changes for a sustainable future (BERA, 2021, p. 2).</p>

**Session overview/aims**

Session A1 (University input) and Session A2 (School input)	Session B1 (University input) and Session B2 (School input)	Session C1 (University input) and Session C2 (School input)
<p><b>Teacher Positionality</b></p> <p>Provoking thought/overview on why we are asking these questions on climate change. Use key phrases to support learners to critically engage with new information as it emerges – key questions relating to 'What is my positioning as a teacher?'</p>	<p><b>Climate Justice</b></p> <p>Exploring 'What is climate justice?' Examine the intersectionality of climate justice and its impact on individuals (UN, 2015).</p>	<p><b>Climate Action – personal and collective</b></p> <p>Encouraging personal action from both ITE students and pupils. How personal action can ripple out into collective local, national, and international action. (DfE, 2021)</p>

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## SHARE/COMMUNICATE/COLLABORATE

### Knowledge

- Cause and consequences (local, global) of CC (IPCC; 2021). Climate education and sustainability education, links.
- Mitigation and adaptation (Thew et al., 2021)

### Attitudes, Values and behaviours

- Developing affective and behavioural skills
- Facilitate approaches that support the cultivation of Global citizenship (Thew et al., 2021)

### Competences

- Developing systems thinking, strategic thinking, collaborative competency, critical thinking, self-awareness and integrated problem-solving (Ojala, 2016)
- Support learners to critically engage with new information as it emerges and assessing trusted sources- what level of confidence should I attach (Thew et al., 2021).





# ITE Climate Education Framework: Strand 2 NCEAP

## Aims and learning outcomes

Adapted from Thew et al. (2021)

### Knowledge

The causes and consequences of climate change (IPCC, 2021a, 2021b, 2021c).

Climate change's consequences on a local and global scale, with an emphasis on different aspects of the problem having different levels of confidence and certainty, e.g. it is much easier to say things at global level rather than local.

How does climate change link with other aspects of sustainability?

What solutions are available and what are the implications of choosing between these solutions for social and environmental justice?

Furthermore, what understanding of the mitigation and adaptation will be required because of climate change?

We can do something about it now but we also will need to adapt to a different climate; some of the change is here and some will happen yet (Thew et al., 2021).

### Attitudes, values and behaviours

To develop affective and behavioural skills that enable engagement with climate change and its impacts, i.e. 'approaches that cultivate integrated knowledge and global citizenship, while preparing students for curious, well-informed, big-hearted lives' (UNESCO, 2017).

This should showcase examples of, and provide opportunities for, behavioural change as UK Higher Education institutions can facilitate the process of ensuring knowledge, values and affective responses translate to action (Thew et al., 2021, p. 3).

Share BERA Manifesto for education and environmental sustainability to further enhance shared values for education and sustainability (BERA, 2021; Dunlop et al. 2022).

### Competences and capabilities

Enabling the learner to act and work with others to solve problems.

Developing systems thinking, strategic thinking, collaborative competency, critical thinking, self-awareness and integrated problem-solving (Ojala, 2016).

Supporting learners to critically engage with new information as it emerges and assess trusted sources – how do I know that climate information and projections are realistic, and what level of confidence should I attach? (Thew et al., 2021).

Building eco-capabilities (Walshe et al. 2022) to support wellbeing and live sustainable lives.

Capabilities such as 'knowledge for action, data literacy, creativity' etc are needed to enact these changes for a sustainable future (BERA, 2021, p. 2).



# A competency approach to ESD



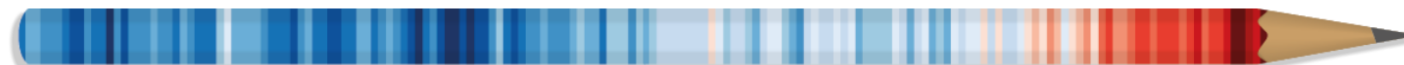
<p><b>AdvanceHE</b> </p> <p><b>Education for Sustainable Development Guidance</b></p> <p>March 2021</p> 	<table border="1"> <thead> <tr> <th>Competency</th><th>A student who displays this competency can:</th></tr> </thead> <tbody> <tr> <td><b>Systems thinking competency</b></td><td> <ul style="list-style-type: none"> <li>recognise and understand relationships</li> <li>analyse complex systems</li> <li>consider how systems are embedded within different domains and scales</li> <li>deal with uncertainty</li> </ul> </td></tr> <tr> <td><b>Anticipatory competency (future thinking)</b></td><td> <ul style="list-style-type: none"> <li>understand and evaluate multiple outcomes</li> <li>create their own visions for the future</li> <li>apply the precautionary principle</li> <li>assess the consequences of actions</li> <li>deal with risks and changes</li> </ul> </td></tr> <tr> <td><b>Critical thinking competency</b></td><td> <ul style="list-style-type: none"> <li>question norms, practices and 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Table 1: UNESCO's key competencies for sustainability

Table 2: Learning outcomes aligned with key competencies for SD  
(Informed by UNESCO (2017), ESDG Guidelines (2014), and Giangrande et al (2019))

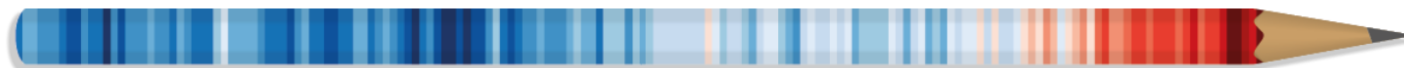
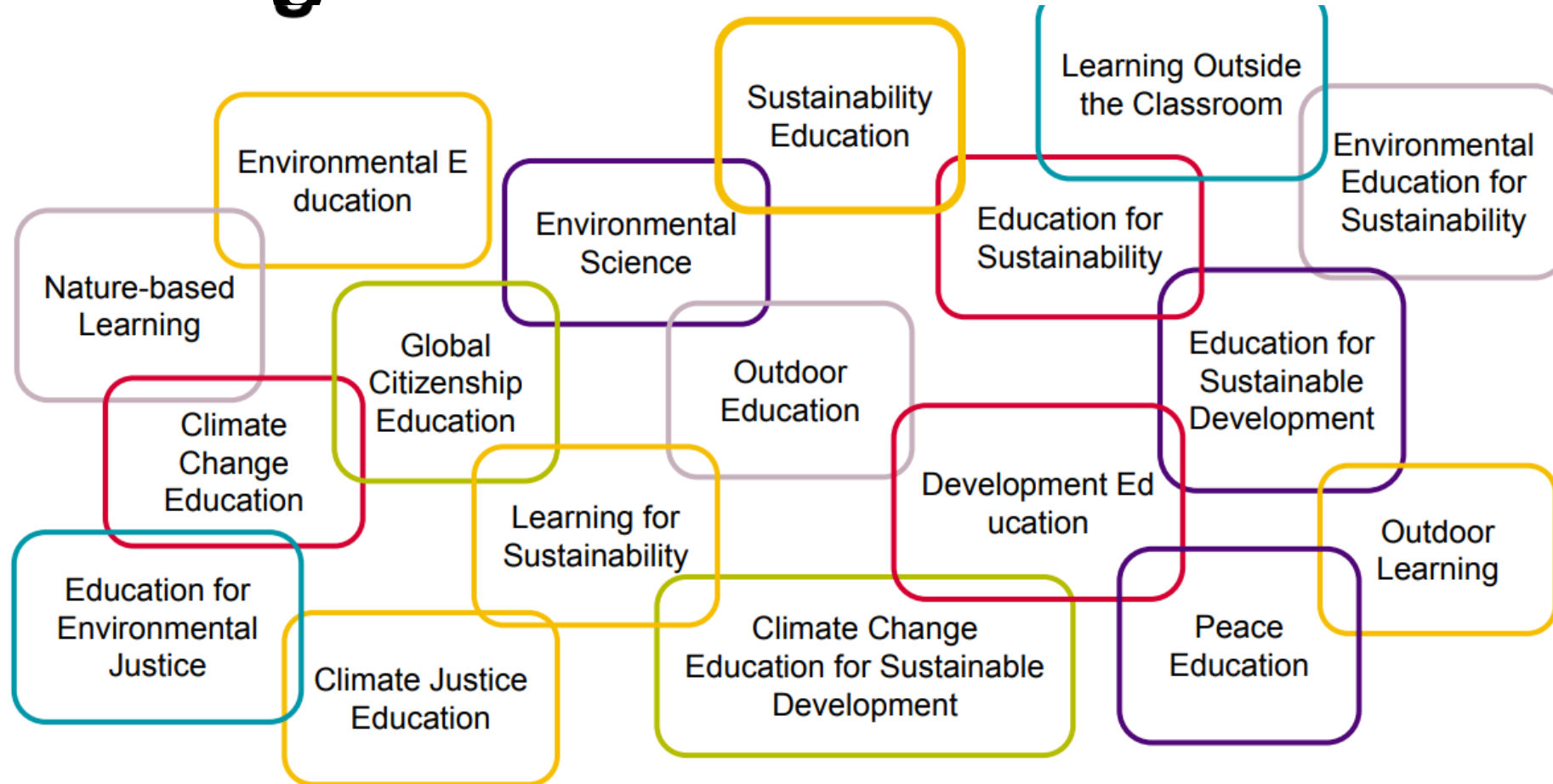
Learning outcomes		
Knowledge	Skills	Attributes and values
A student with systems thinking competency can:		
<ul style="list-style-type: none"> <li>Describe the relationships between environmental, social and economic systems, at scales from local to global level</li> <li>Identify the tensions between the 17 SDGs and recognise their interconnections</li> <li>Recognise that a collective effort is not necessarily just a simple sum of each individual's effort, but is likely to be more complex and have multiple drivers that may be personal, political or communal</li> <li>Identify that positive or negative environmental change may arise from economic growth</li> <li>Describe how power structures and political systems influence SD</li> </ul>	<ul style="list-style-type: none"> <li>Recognise and understand relationships</li> <li>Analyse complex systems</li> <li>Consider how a system's constituent parts interact and operate at different scales and across time</li> <li>Work with interconnectedness and complexity in a systemic context, synthesising diverse information and data to offer a range of potential solutions</li> <li>Identify the interactions between social, economic and environmental systems</li> <li>Assess a problem from different scales and perspectives</li> </ul>	<ul style="list-style-type: none"> <li>Think systemically, in terms of recognising connections and interactions between factors, and understand that actions often have multiple consequences</li> <li>Deal with and manage uncertainty</li> <li>Appreciate the root causes of unsustainable development including environmental, social and economic actions, and their links to cultural considerations</li> <li>Identify the factors that have the biggest potential for driving constructive change</li> </ul>

Systems thinking competency	Anticipatory competency
Critical thinking competency	Strategic competency
Collaboration competency	Integrated problem-solving competency
Self-awareness competency	Normative competency

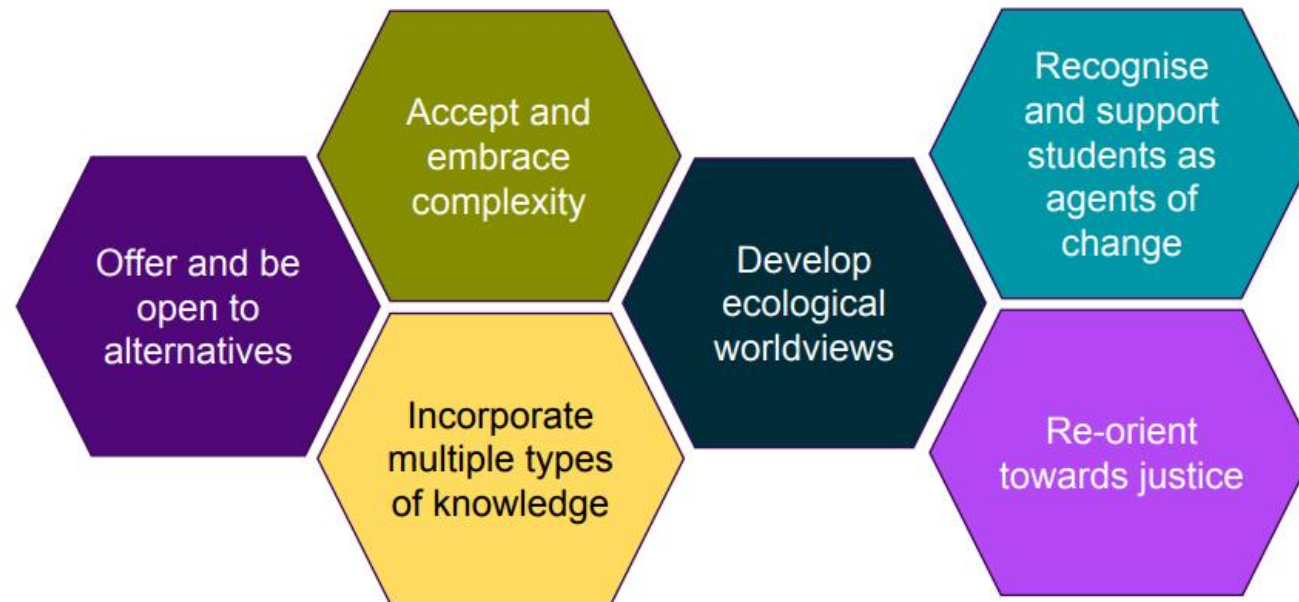




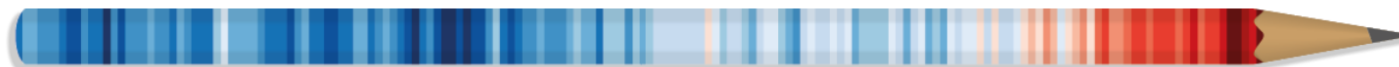
# Framing the Field



# Qualities of climate change education



(Greer and Glackin, 2021)





# Secondary ITE: Climate and Sustainability Education

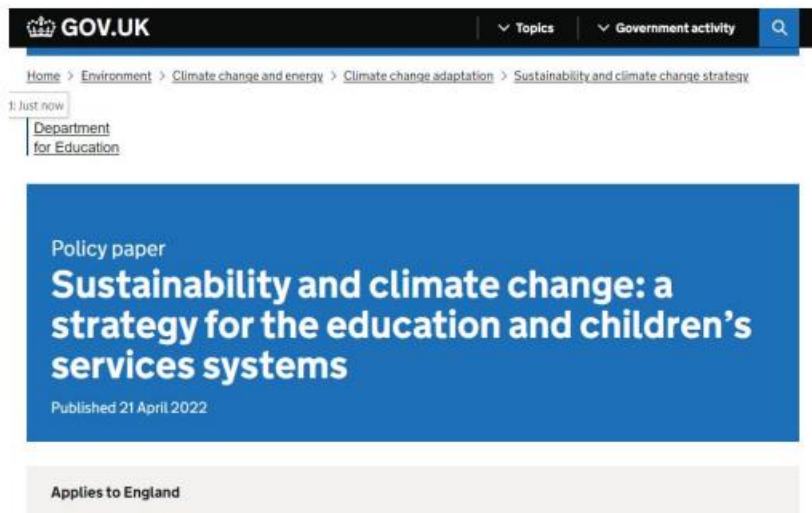
A child taught by RPTs from different subjects will:

- Use science and data interpretation to make informed arguments about sustainability and climate change.
- Explore the interconnectedness and co-dependence of humans, nature and climate.
- Develop as meaning creators and *into* ethical decision-makers in their own lives.
- Demonstrate openness to global, national, local and personal critique about practices.
- Experience creative, collaborative pedagogies and produce original outcomes.

(Will Bailey-Watson, 2023, PGCE Secondary)



# A new sustainability and climate change strategy



DfE Policy Paper

## Five action areas:

- Climate education
- Green skills and careers
- Education estate and digital infrastructure
- Operations and supply chains
- International

## Three initiatives:

- National Education Nature Park
- Climate Action Award
- Sustainability Leadership





# STAGE 2: Pilot 2022-23

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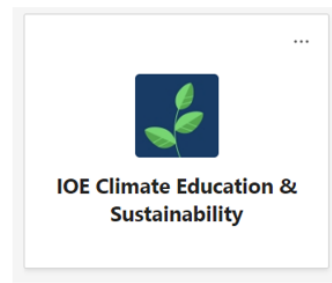
GUIDE/ SUPPORT/ BUILD UNDERSTANDING

REVIEW & CELEBRATE

## Resources

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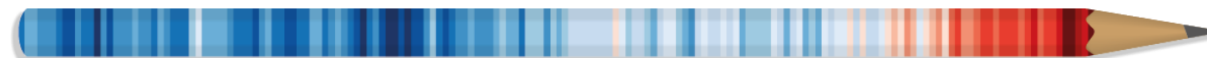
DEVELOPING...



Pre & Post Student Survey

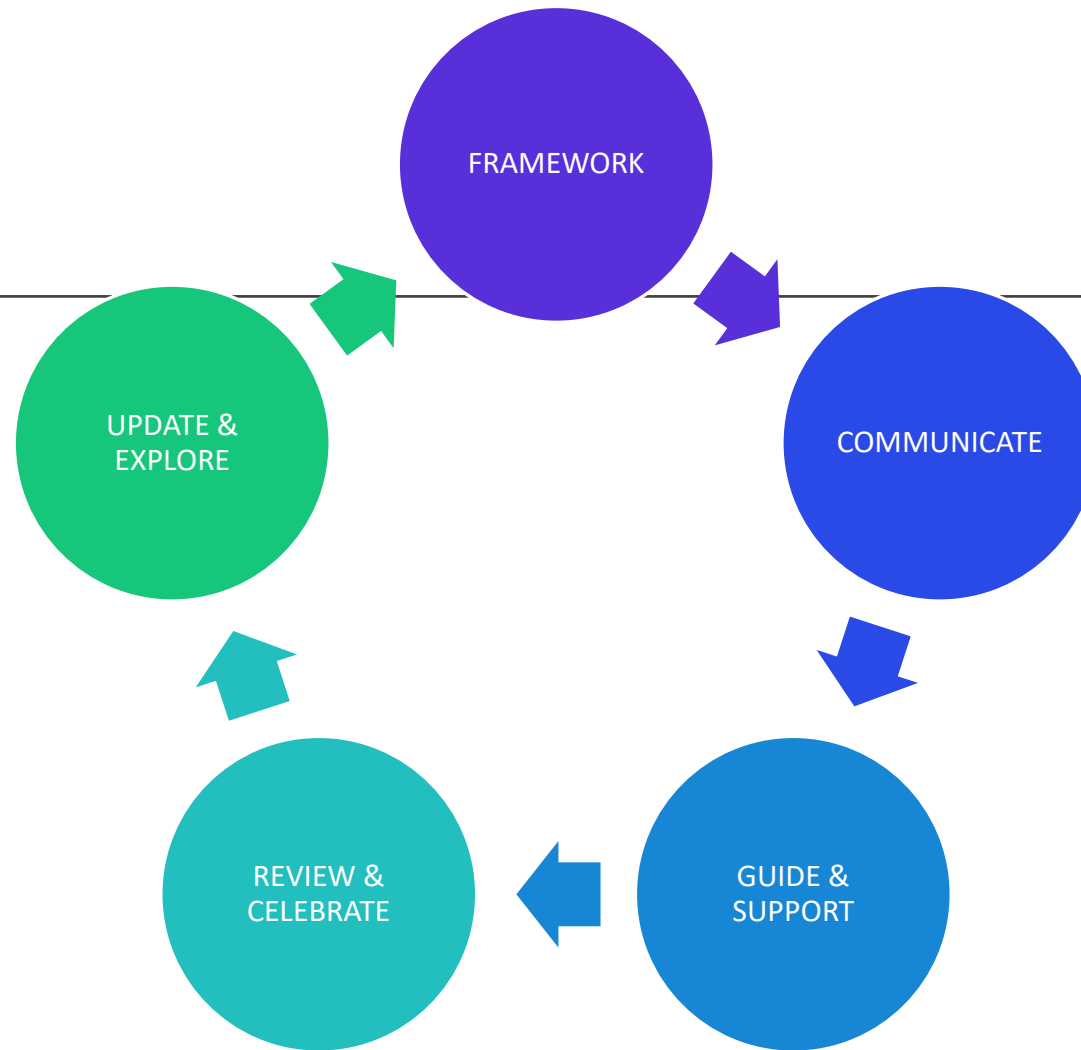
Observations Taught Sessions

Post Focus Groups (students & academics)



# Cycle

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# Student Responses (67 - Survey 1)

- Current understanding of climate and sustainability education:  
*'Process of giving kids an accurate understanding of climate change and sustainability education'*  
*'I have little understanding but would most definitely like to incorporate it into my own teaching and help increase awareness through my own teaching'*  
*'not a lot... limited... very little'*
- Developed understanding through own research - 44%
- Developed understanding through formal education – 32%
- Range in confidences – but negatively skewed
- 64% respondents felt climate change needs to be prioritised in schools and predominantly in science, geography, PSHE with a few responses suggesting more broadly



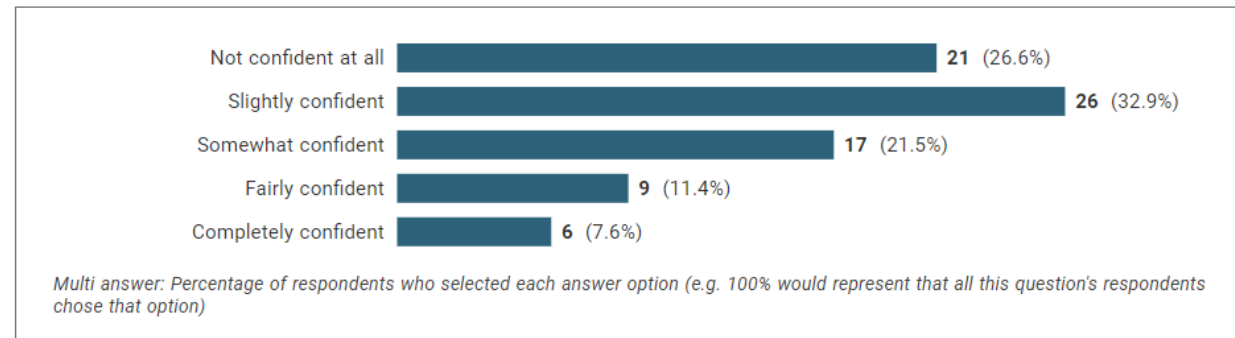


# Student Responses (79 - Survey 2)

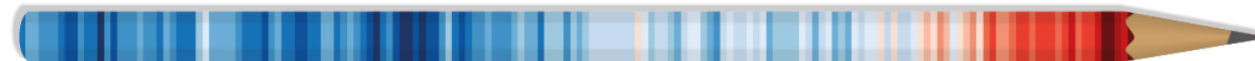
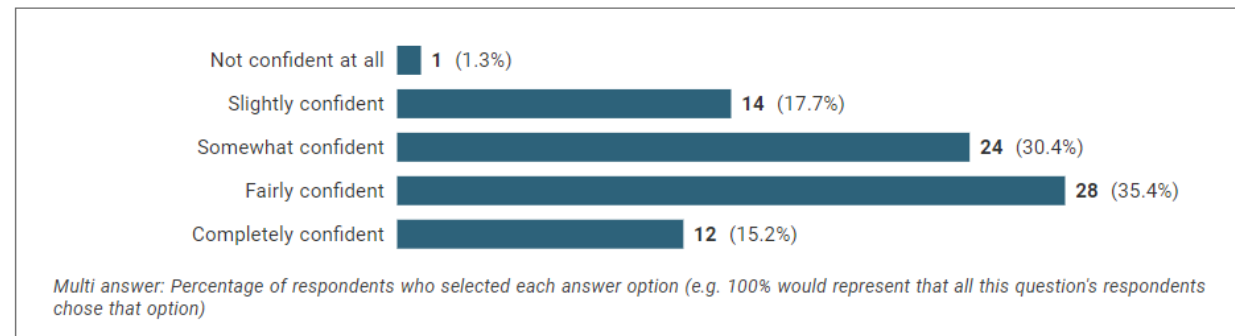
7 Indicate below your confidence to teach climate and sustainability education

- Shift in confidence

7.1 At the start of this academic year

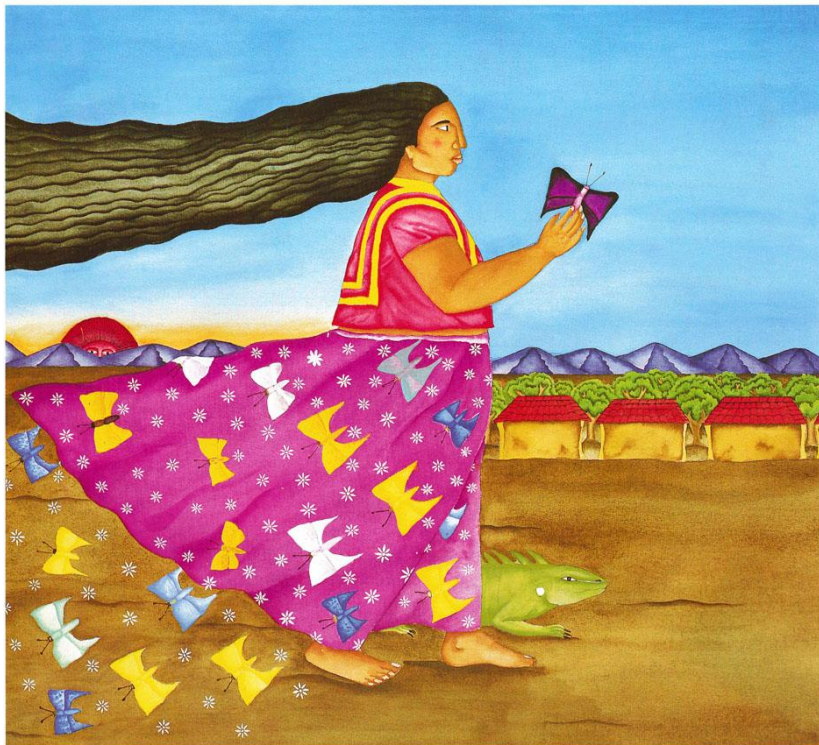


7.2 At this point in the academic year (end)



# Example Secondary

## Drama: Process Drama



## English: Ecocentricism

### A View from the Chair

News and Views ■

## Looking Back, Thinking Forward

English can and should be part of the conversation about sustainability and the environment, argues **Rachel Roberts**, looking to ecocriticism as a way forward.

This is my final 'View' as Chair. It has been a privilege being Chair – and has certainly not been a dull two years! My tenure began in the bleak mid-winter lockdown of January 2021. The world felt closed, lives curtailed as we were forced to remain house-bound, separated from each other. Teaching throughout the pandemic was no easy task and it forced many aspects of practice online.

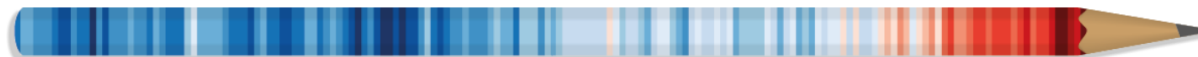
Addressing such things as the removal of external exams, the difficulty in facilitating oracy and discussion in Covid-restricted classrooms, and the decline in A Level English, the last two years have been a bumpy ride for teachers of English. Yet we as a group can be proud of NATE's recent achievements, especially the work of the Reviewing Literature Working Group: which can still be heard via recordings of our online conferences on the NATE website. NATE turns 60 in 2023 and we have much both to celebrate and look forward to, not least our forthcoming annual conference *Re-imagining English, Re-connecting English Teachers* in November.

- How do our metaphors of the land influence the way we treat it? That is, what is the link between pedagogic or creative practice and actual political, sociocultural and ethical behaviour towards the land and other non-human life forms?

We can then, as teachers of English, enable children to engage with the wider world and their position in it.

#### **The Prelude**

One obvious location for such work might be Wordsworth's *The Prelude*, an extract from which features in the GCSE poetry anthologies for several exam boards. The Romantic poets, drawing on ideas of the sublime, disrupted the staid Augustan representation of the picturesque. Wordsworth, as Rigby (2014, p.65) writes, 'reposition[ed] ... the human as part of Nature', seeing 'all natural entities as interrelated', an approach 'often seen as exemplary of "Romantic ecology"'.  
We see this approach at work in the extract from *The*

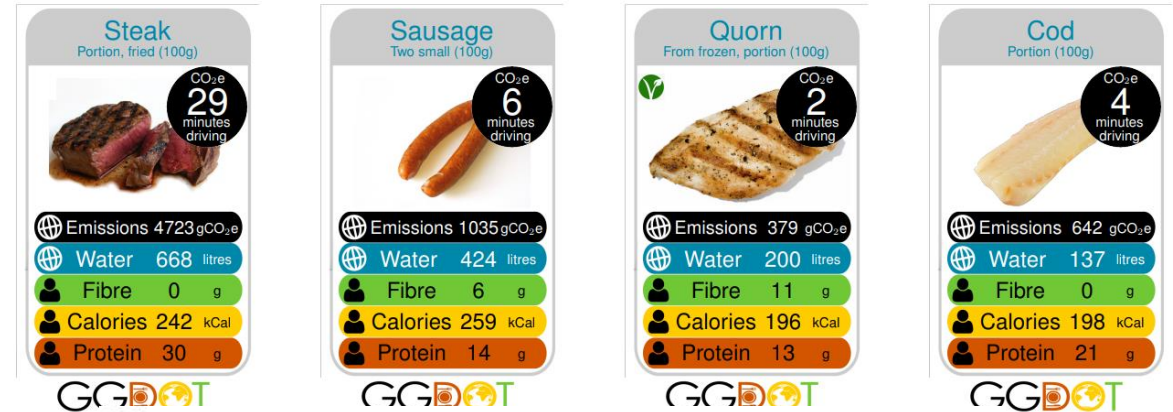


# Examples Secondary

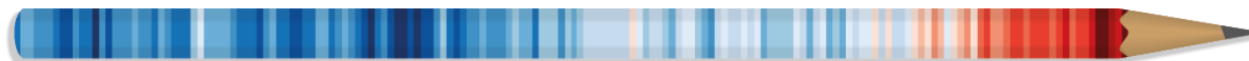
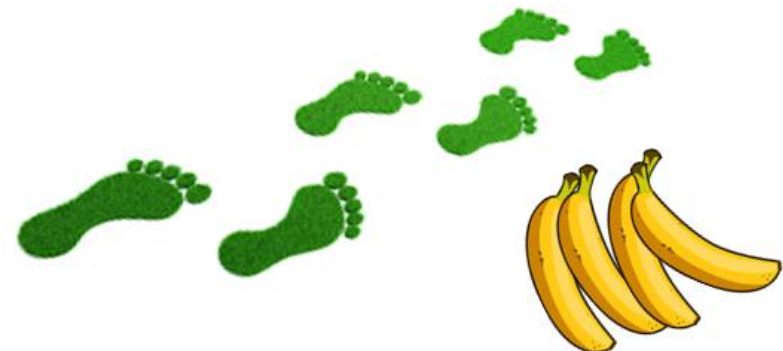
## Art/Science: Plastic Garden



## Mathematics: Games



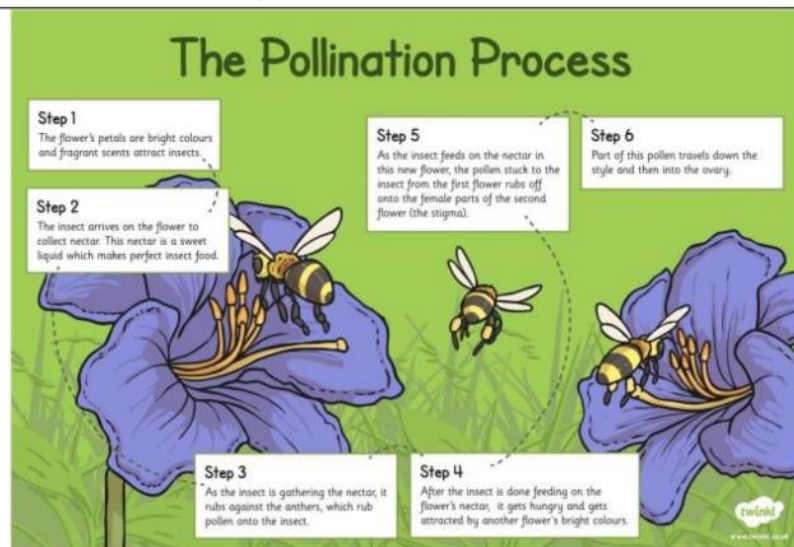
## THE CARBON FOOTPRINT GAME





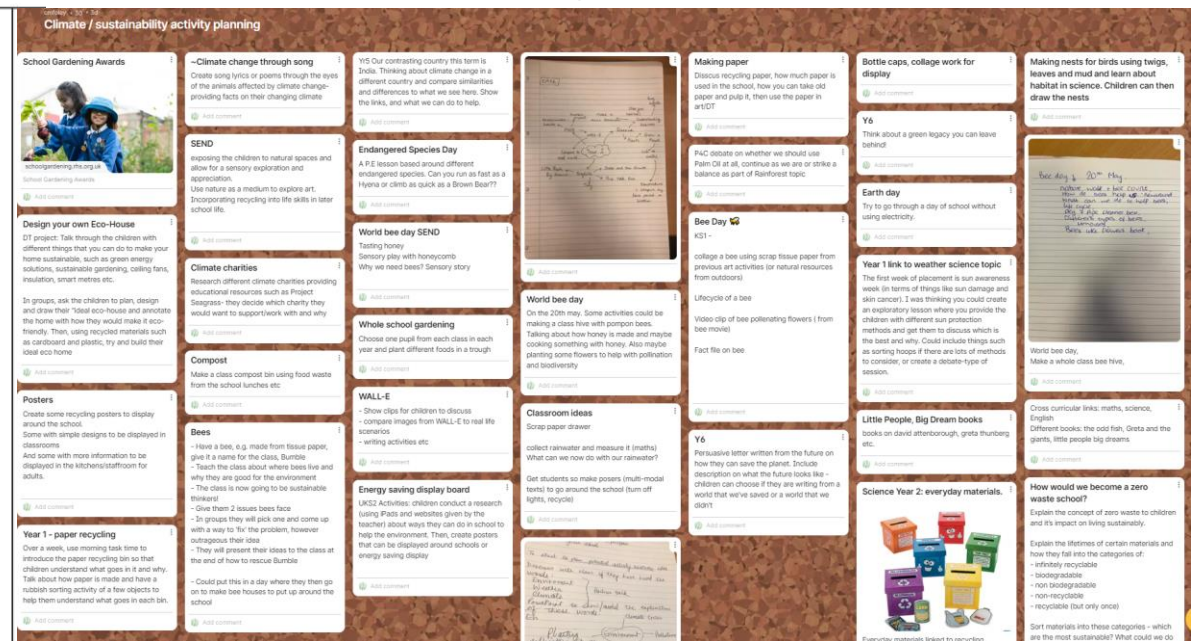
# Examples Primary

## • BA Primary Lesson Plan



Once children are familiar with the pollination process, get them to draw a storyboard of each stage, using the key vocabulary noted to describe what is happening in each scene as they have just discussed. This should only be a brief activity, set aside around 15 minutes for completion.

## • PGCE/SD Primary





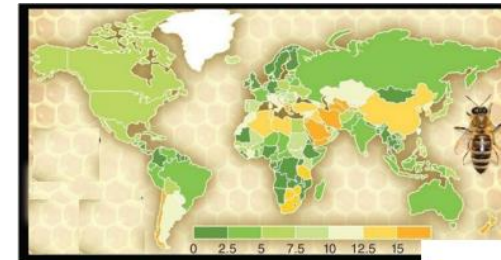




# Bee Meadow Project

## BeeMeadow Project

- Stage 1: Competition to design the Bee Hotel- collaboration with schools
- Stage 2: Launch 20 May 2022 T&L site (LR)
- Stage 3: Further development of T&L site with MERL, Schools, IOE programmes and TLEP Project – resources and activities
- Stage 4: Celebration 2023, MERL and Showcase Event Living Laboratory
- Stage 5: Review of Pilot, T&L space and impact, developing a larger research funded project

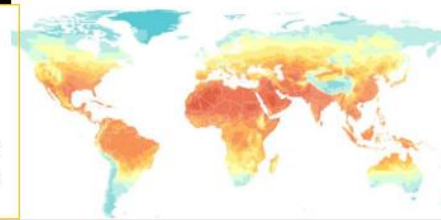


Task: Mapping insect pollination and current global climate readings.

**Think, Pair, Share:** Is there a strong relationship between the countries impacted the most by a loss of insect pollination and global climate readings?

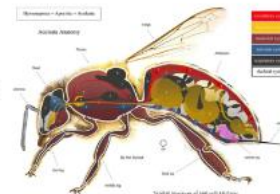
**Task 1:** Using the animal pollination map, colour in the countries that will be the **most (3)** and **least (3)** affected by a decrease in animal pollination.

**Task 2:** Using the global climate map, suggest **1 reason** as to why animal pollination may be decreasing in some countries.



## Bee Biology

**Activity 1:**  
Look at the anatomy of a bee.  
How do you think it uses parts of its body?



## Bee Nests

Explore how bees make and use their nests, including choice of cavity, position, exposure and height from the ground – species dependent.

**Activity 3:**  
Compare your bedroom with a bee nest, thinking about:

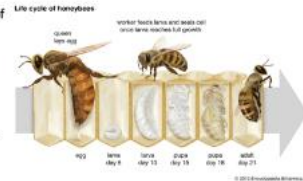
- Positioning of your room - how much sun do you get?
- How big it is - what do you do in your room?
- Who used to have your room or was it used for something else?
- What level is your room on? Does this make things easier or harder for you?
- How many people can you fit in it? Would you be able to live and work so closely together like bees can?



## Bee Lifecycle

Explore the lifecycle of a bee and roles of bees.

**Activity 2:**  
How do bees' roles relate to jobs that humans do? Can you think of any similarities?



## Bee Habitats

What is your neighbourhood like?  
How do other people live around the world?  
**Activity 4:**  
Explore bee species habitats and how they differ around the world.  
Are there any of the same features?  
How do bee habitats compare to human neighbourhoods?

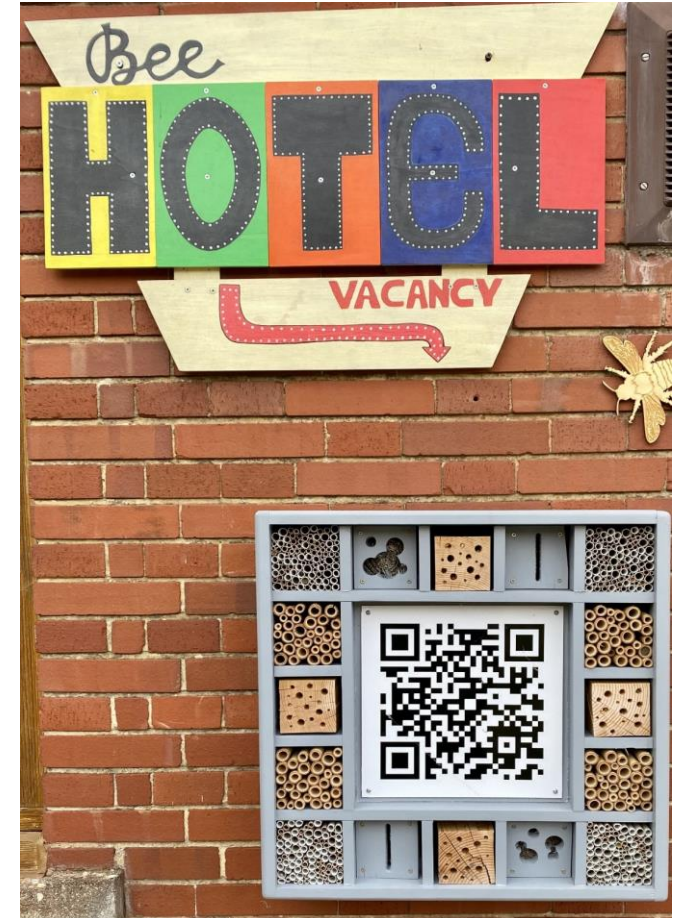




## Socio-nature encounters & engagements

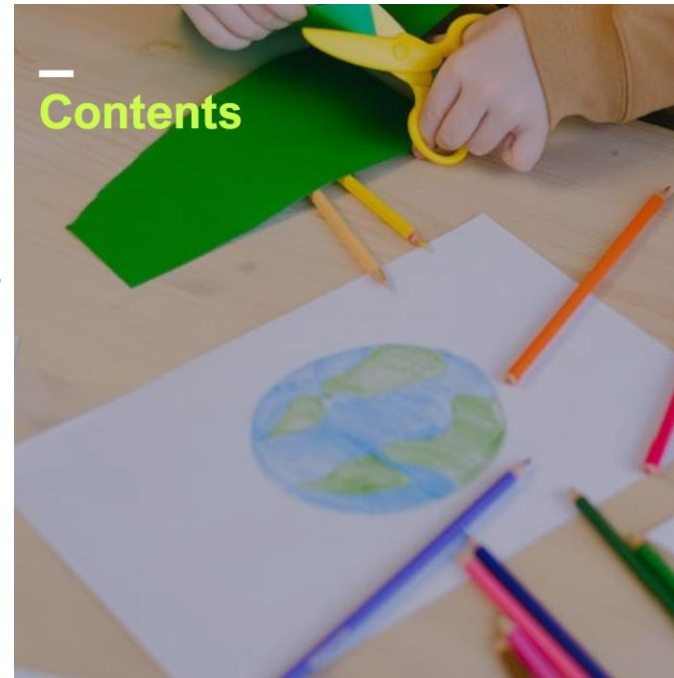
The 'Harawayan' Bee Hotel as an educational tool to catalyse a sustainable relationship with nature

- STUDENT POSTER



# National Roll-out & DfE

- Summary Leaflet
- Submit EOI for full framework - <https://forms.office.com/e/SPsE9aX6Nr>
- Community of Practice for ITE Providers



Welcome to another Department for Education (DfE) Climate in Education Snapshot!

In this edition:

- National Education Nature Park and Climate Action awards
- Hidden Nature Challenge
- Youth Focal Points
- University of Reading ITE Framework
- International Green Skills Conference
- Bristol Education Partnership
- Information you may find useful
- Subscribe or unsubscribe from this snapshot

Please continue to share with us the work you have been doing so that we can share wider.

New to our strategy and work? Check out our



# National Roll-out



— Empowering Teacher Trainers and Initial Teacher Trainees

The University of Reading is driving action to ensure that the next generation of teachers are empowered to help transform climate education for young people.

The [National Climate Education Action Plan](#), which emerged following the Climate Education Summit held by the University of Reading in advance of COP26, recognises the important role of teachers in transforming climate education for all young people in the UK. Action 2 in the Plan is that "All teacher trainers and initial teacher trainees should be able to access training that empowers them to effectively incorporate climate education within their teaching across all levels and subjects."

The University of Reading is leading the response and its Institute of Education has developed the [Climate Education and Sustainability Initial Teacher Education \(ITE\) Framework](#). The Framework, which runs from Early Years through to Sixth Form, as well as all subjects, was piloted throughout the 2022/23 academic year across all of Reading's ITE programmes. Reading's trainee teachers are empowered to develop their knowledge and understanding of the climate crisis, graduating with a set of skills to support the young people to build resilience, and to become future changemakers.

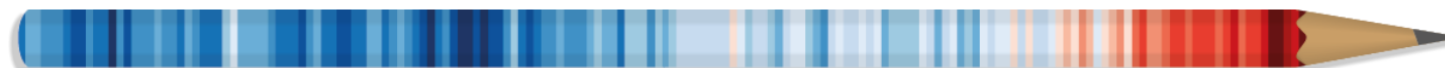
The Framework has been updated in light of the pilot and is now shared, for free, to other training providers to support in delivering on this important agenda. [Find out more about the Climate Education and Sustainability ITE Framework.](#)

*"The [primary children] had the idea of building green cities. They were mesmerised. They were very proud to create their own green cities, and I was very proud of them."*

Neeta, Primary trainee, University of Reading

*"We've looked at climate and sustainability in every project. If we were to have students that come into that lesson, retain that knowledge, they're going to be having this massive positive effect – we're going to be having products that are going to be lasting longer and it's just going to be this great vision of helping the planet."*

Dom, Secondary Design & Technology trainee, University of Reading.





# Challenges

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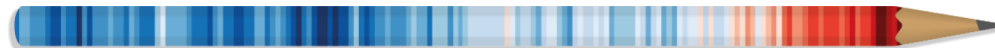
- Don't need to teach climate science
- This is not climate science – I teach p.e. what's it got to do with me?
- Why would we do it – schools are behind
- Schools are too busy
- It is not in the ITE core curriculum framework (we have mapped this out) or all schools in the NC
- The DfE strategy for sustainability and climate education is not a policy..... there is a strong argument for following the Governance advice NGA
- It is complex – people need to learn to be comfortable with complexity – the world is complex and people need to learn to see the connections, problem solve etc...



# Successes

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- Collaboration
- Small wins
- Examples to share and showcase
- Providing initial guidance, support to empower others
- Modelling it for them to then model.... Growing snowball effect...
- Where it is embedded and not added on as an extra thing to do - success
- Students can be very passionate about it
- Perseverance, resilience, keep trying
- Leadership at all levels
- Getting comfortable with the uncomfortable – systems thinking and complexity



# Potential impact

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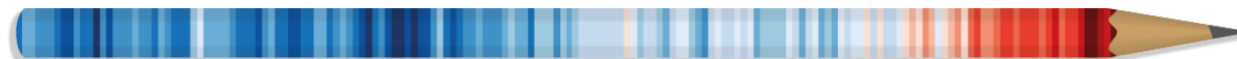
**Driving Change** across 600+ schools/learning organisations

**Driving Change** across 4 ITE HEI providers for ITE in England

**Professional Development** for Teacher Educators, Training Teachers and School Partnerships

NCEAP – feeds into the Department for Education Priorities and Strategy/**Policy Development at the National Level**

**Developing Competences** needed for Climate and Sustainability Education to drive change





# References

- DfE Policy Documents
- **Greer, K., & Glackin, M.**, (2021). 'What counts as CCE?' *School Science Review*,. 103(383)
- **IPCC** (2022). *Summary for Policymakers*. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 3–33
- **Majid, N.; Marston, S.; Reed Johnson, J.A.; Happle, A.** (2023). Reconceptualising Preservice Teachers' Subject Knowledge in Climate Change and Sustainability Education: A Framework for Initial Teacher Education from England, UK. *Sustainability* 2023, 15, 12237. <https://doi.org/10.3390/su151612237>
- **Reed Johnson, J.A., Marston, S.; Happle, A.; Majid, N.** (pending). Implementation of a Climate Change and Sustainability Education Framework into pre-service teaching: opportunities for initial teacher education. *Cogent Education Journal* 2024
- **Thew, H.; Graves, C.; Reay, D.; Smith, S.; Petersen, K.; Bomberg, E.; Worsfold, N.T.** (2021) Mainstreaming Climate Education in Higher Education Institutions. COP26 Universities Network Working Paper. In Proceedings of the 26th United Nations Climate Change Conference COP26, Glasgow, UK, 31 October–12 November 2021.

[DfE's Climate in Education Snapshot - May 2023 \(office.com\)](#)

[DfE's Climate in Education Snapshot - November 2023 \(office.com\)](#)

