

The role of science education in whole-school approaches to the climate and environment emergency



**The key contributions of
subjects to climate change
and nature education:
a curriculum policy proposal**



*Council for Subject Associations
A Voice for Subjects*

Particular thanks are due to Liz Moore and colleagues at the Council for Subject Associations for their ongoing support in facilitating opportunities to raise the profile of climate change and nature education and to work collaboratively with subject associations.

In particular, we are asking that:

One of the overarching aims of the national curriculum should respond to the climate and nature crisis.

The aims of every subject in the national curriculum should include a reference to their distinctive contributions to climate change and nature education.

What is the distinctive contributions to climate change and nature education of:

Biology?

Chemistry?

Physics?

Science?

Education should: help young people to discover their deep connection with nature; understand the diverse forces shaping the built and natural environment; develop the preparedness needed to build a more climate resilient and equitable future; and support collective action for the good of people and planet.

Art, craft and design provides a safe space to explore difficult concepts, fostering autonomy, original thinking and innovation. Learners can be empowered to engage with climate change and sustainability through meaningful and personal creative exploration, critical and contextual analysis, developing design behaviours and material literacy. The freedom of a curriculum that is concept rather than content driven provides the opportunity to nurture nature connectedness, explore socially engaged practice, and deliberate on the meaning of citizenship. Art, craft and design equips learners to not only solve, but identify problems with agency, harnessing the power of imagination, creativity and design thinking.

Learning about **biology** enriches a young person's view of the world, enhances their capacity to appreciate nature and helps to inspire the next generation to care, think, innovate and work together to protect and improve the world we live in. Biology can provide young people with the knowledge and skills to understand environmental interactions and processes and provide insight into some of the solutions to the current climate and nature crises. Biology supports young people to become scientifically literate citizens and helps them to make informed choices, including about the environment around them.

Chemistry education enables learners to understand the world around them and provides people with the knowledge and skills to tackle environmental challenges facing society on key topics such as air pollution, climate change, sustainable materials and green energy technologies. By exploring local, global and national contexts, young people can gain understanding of the chemical processes which underpin the causes, consequences and potential solutions to these challenges. Chemistry empowers young people to make decisions about their own lives and critically evaluate scientific developments. Through developing chemistry skills and knowledge, young people are equipped to make informed decisions and contribute to a more resilient future for all.

Studying **physics** develops learners' understanding of why the temperature of our planet is increasing which enables them to make evidence-based decisions relating to climate and sustainability, such as which energy resource we should use to generate electricity. They also learn about how scientists monitor climate change and use computer models to determine its likely consequences. Furthermore, young people learn how to use evidence, reasoning and logic to evaluate and develop arguments relating to potential solutions.

School **science** provides an essential understanding of the natural and physical environment. As well as a body of knowledge, science shows how our understanding of the environment continues to evolve and explains how that knowledge has been accumulated over time through experimental and theoretical methods. Finally, science education provides an opportunity to develop the ability to critically examine claims about environmental issues in order to distinguish between reliable information, disinformation and misinformation.

Music is an essential form of expression for young people, enabling them to connect with - and make sense of - a complex and changing world. The songs and instrumental music of the past, as with history, poetry and art, map out a record and catalogue of issues that have affected the environment and our natural world. Music in the curriculum is also an opportunity for young people to look into their future and nurture their imagination by creating their own music for different purposes, including to influence others. Finding learners' unique voice and making music together as choirs, ensembles and bands strengthens community cohesion and young people's sense of interdependence and supports young people's social development. Together with more sustainable ways to make and listen to music, this process is essential for more sustainable futures.



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Identifying effective climate change education strategies: a systematic review of the research

Martha C. Monroe, Richard R. Plate, Annie Oxarart, Alison Bowers & Willandia A. Chaves

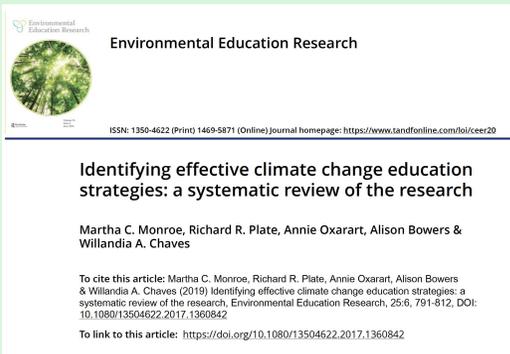
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Effective climate change education

Four themes specific to issues such as climate change were also generated:

- (1) engaging in deliberative discussions;
- (2) interacting with scientists;
- (3) addressing misconceptions;
- (4) implementing school or community projects.



1. Engaging in deliberative discussions



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Inspiring the next generation
of climate leaders

InterClimate Network engages young people with the challenges of climate change, inspires their climate action, and promotes their voices in their own sustainable future.

2. Interacting with scientists



Capital City Public Charter School



The 5-minute interview with a scientist

Choose a scientist who you think your students would find interesting.

Write five questions that you would ask them.

What do you want your students to get from listening to the interview?



Some examples of what citizen science looks like

Levels of Citizen Science

Level 4 'Extreme'

- Collaborative Science – problem definition, data collection and analysis

Level 3 'Participatory science'

- Participation in problem definition and data collection

Level 2 'Distributed Intelligence'

- Citizens as basic interpreters

Level 1 'Crowdsourcing'

- Citizens as sensors

A local citizen science project

3. Addressing misconceptions



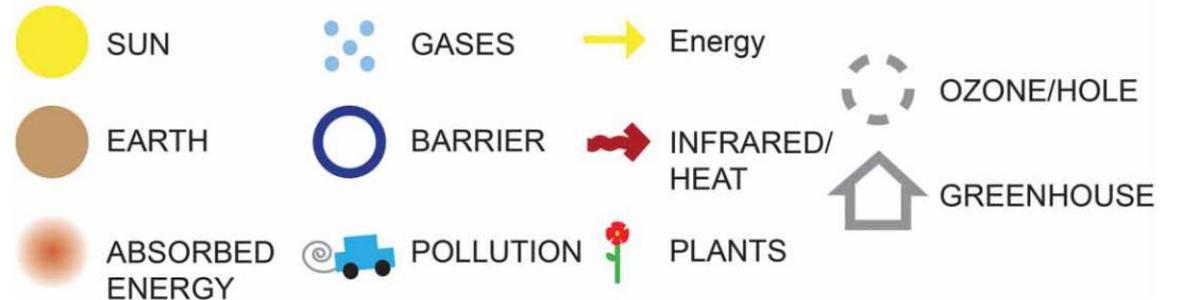
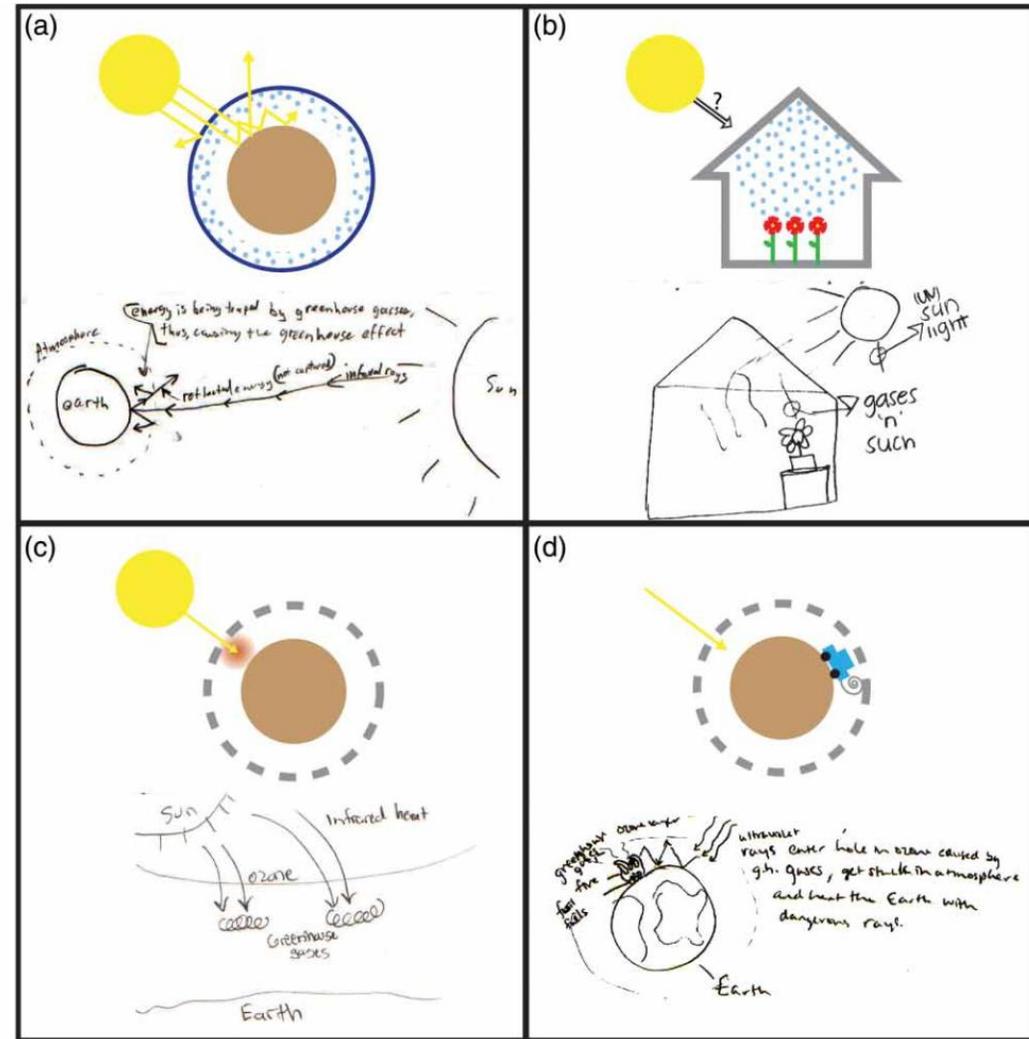
Misconceptions

What are the most common misconceptions that your students have?

Factor Analysis of Drawings: Application to college student models of the greenhouse effect

Julie C. Libarkin^{a,b*}, Stephen R. Thomas^{b,c} and
 Gabriel Ording^{b,d}

^aGeocognition Research Lab, Department of Geological Sciences, Michigan State University, East Lansing, MI, USA; ^bCenter for Integrative Studies in General Science, Michigan State University, East Lansing, MI, USA; ^cDepartment of Zoology, Michigan State University, East Lansing, MI, USA; ^dDepartment of Entomology, Michigan State University, East Lansing, MI, USA



4. Implementing school or community projects



Visual approaches

Edward Burtynsky



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