

Opportunities for Enhanced Climate Change Education in Current English GCSE Specifications and KS3 Teaching

The Royal Meteorological Society (RMetS) believes that every student should leave school with the basic climate literacy that would enable them to engage with the messages put forward by the media or politicians, or to make informed decisions about their own opportunities and responsibilities.

The DfE Sustainability and Climate Change strategy (2022) states “The challenge of climate change is formidable. For children and young people to meet it with determination, and not with despair, we must offer them not just truth, but also hope. Learners need to know the truth about climate change – through knowledge-rich education. They must also be given the hope that they can be agents of change, through hands-on activity and, as they progress, through guidance and programmes allowing them to pursue a green career pathway in their chosen field.”

There is high awareness and concern amongst young people about climate change* and broader environmental issues as well as repeated calls from them, and others, for schools to teach more**.

Curriculum reform is a complicated and time-consuming process that may not achieve its stated aims. We strongly believe that significant improvements can be made on a much shorter timeframe by working with the current curriculum and exam specifications.

There are many, many opportunities for climate change education within the current English National Curriculum and exam specifications – the key to realising these opportunities is to demonstrate to the exam boards, teachers and students where the

links are and to provide classroom ready resources, sample exam questions and support materials for teachers. Small and rapid changes could lead to students leaving school with a far better appreciation of the relevance of what they have learned to their understanding of climate change and its relevance to their future lives and careers. Crucially, this can be done without increasing teacher workload or the volume of content covered.

In some subjects, teachers will already be talking about climate change and sustainability. In others, the relevance of the material that is already being taught will only be obvious to teachers that already have some expertise.

In 2022, the Royal Meteorological Society (RMetS) asked climate change experts from a wide range of subject disciplines (including climate science, economics, communication, policy etc.) to look for links to climate change in the current English GCSE specifications and KS3 curriculum. This resulted in over 120 expert reviews spanning over 100 GCSE specifications and KS3 documents. Teachers were then asked to comment on the relevance of the reviews to their classroom practice.

* <https://www.savethechildren.org.uk/news/media-centre/press-releases/survey-reveals-scale-of-climate-anxiety-among-british-children> <https://www.rmets.org/news/despite-around-half-school-leavers-54-saying-they-have-had-education-climate-change-past-year>

** Teach the Future <https://www.teachthefuture.uk/vision>

At the moment, the lion's share of the teaching about climate change takes place in Geography and Science lessons. However, not all students take geography at GCSE, and coverage in Science is limited and will depend on the path students take through Science GCSE. In addition, there are aspects of climate change that are not covered by these subjects, and are more relevant, for example, to Design and Technology, Art or English.

Amongst the experts, there was general surprise both at how much climate change already featured in the specifications, and in how many opportunities there were, across the subject range, for more links to be made from what students were already learning to their perceived understanding of climate change.

Where links to climate change have been identified by the Expert Reviewers, many teachers have requested support materials for ease of integration into existing lessons or schemes of work. For example, in subjects like Art or Music, which may be valuable places for students to express their climate change anxiety or appreciation of the natural world, it might be helpful for teachers to be made aware of artists and musicians inspired by environmental issues.

Although it was beyond the remit of this study, in some places the Expert Reviewers also identified places where small changes to the existing specifications could provide even more opportunities for climate change teaching.

GCSE Design and Technology is a subject with numerous existing, explicit links to learning about climate change and sustainability, through analysis of the LSA (life-cycle assessment) of products, carbon footprints, new and emerging technologies, energy generation and storage etc. One Expert Reviewer suggested that Awarding Bodies might consider mapping specifications to the Sustainable Development Goals (<https://sdgs.un.org/goals>), which includes climate change. The challenge in this subject may lie with providing up to date teacher support

in a rapidly evolving area. Similar opportunities and challenges exist in **GCSE Engineering**.

There seems to be an appetite amongst **GCSE Computer Science** teachers to devote more teaching time to climate change with opportunities linked to the carbon emissions associated with building and running computers (including cloud storage on distant servers), as well as the fact that computer science is an important tool for improving our understanding of the climate system and developing solutions to the climate crisis we face.

GCSE Food Preparation and Nutrition is again a subject with numerous existing links to climate change including explicit ones such as food miles and the more general carbon footprint of foods, and opportunities such as through food security, the impact of changing personal choice and new and emerging foods. The challenge in this subject again may lie with providing up to date teacher support in a rapidly evolving area.

GCSE Citizenship Studies - although taken by only around 22,000 students citizenship studies can play a major role in climate change education. One Expert Reviewer highlighted five overlapping themes. The effects of climate change can infringe on *human rights and equality*, as those who contribute the least are set to suffer the most. The law bridges the gaps between states, businesses and individuals. *The media* has an important role to inform the public about climate change and itself misinform. *Financial and economic* considerations link to individuals purchasing power and the risks of 'greenwashing'. Finally, the electorate can vote for politicians with an impact on local, national and international policies. In addition, there are opportunities for teaching about the rights and opportunities for citizens, individually or collectively to have responsibility and take climate action.

All the Expert Reviewers of **GCSE Psychology** highlighted climate anxiety, particularly amongst young people. This is likely exacerbated because

they do not feel they have any agency to affect changes that will combat climate change. If students are learning about the climate crisis across most of their subjects then it is more likely they will find a way to make their voices heard. It is interesting that those with climate anxiety who attended COP26 in Glasgow (2021) felt more optimistic that they could make a difference. Discussion of climate activism (e.g. Extinction Rebellion, school climate strikes etc.) might be a good place to introduce Reicher's work on group behaviour. Another Reviewer raised the idea that changing norms and laws may lead to a social influence and change in behaviour regarding climate change. In the same way that public smoking was banned, could carbon-intensive activities (e.g. driving big cars over short distances) be regulated in the same way?

Ironically, despite climate issues having such a general and profound significance for societies, human wellbeing and inequalities, the Experts found it difficult to review **GCSE Sociology**, perhaps because of the quite specifically defined topic areas and theorist centred framing of the specifications. According to one Expert Reviewer, traditional sociological paradigms regard science and the environment as separate from society. However, because the climate crisis is made by societal processes and intensifying exploitation of natural resources, Sociology specifications could reflect this. Such a specification could include a discussion of our carbon footprints. It could also address humanitarian disasters or migration caused or exacerbated by climate change. Also, the government response and attitudes towards climate protesters (including the introduction legislation to crack down on them) could be an interesting angle to teach.

GCSE Business already explicitly looks at the tensions between environmental considerations and profit, with multiple opportunities for links such as through opportunities for businesses linked to consumer demand and net zero legislation. Threats

to business through changing weather and climate could also tie in with some specifications, as could workforce (green) skills. This subject would be the obvious place to introduce green finance.

Using more sustainable raw materials and energy could lead to higher prices or inflation in the short term as could be taught in **GCSE Economics**. This subject could also be used to explore government economic/ environmental strategy and the short term cost of mitigating climate change versus the long term cost of inaction. It could also be used to explore the economic impact of a carbon tax or extreme weather events.

GCSE English Language and **GCSE English Literature** operate within the constraints of set texts. However, the persuasive writing, reading non-fictional texts and poetry components of the specifications all present opportunities for students to explore climate change communication while the speaking component could be used to present their own opinions, understanding and anxieties.

It appears that **GCSE Drama** students have wide scope to present ideas related to climate change (perhaps based on climate anxiety) although both Drama and **GCSE Film Studies** will be constrained by the set texts/ films.

Being aware that the current **GCSE Modern Language Specifications** are about to be replaced, the simplest connections in the current specifications lie in the respective global issues/ the environment section, where students could compare climate change impacts, adaptations and mitigations as well as attitudes to climate change in countries speaking the respective language and the UK and when considering green careers. Climate change is a topic many students may wish to speak about. Several teachers have commented that, in the current specifications, the environment topic is one with high potential for improved support and teaching.

There are a few places to include climate change in **GCSE History** which depend on the era and regions of the world being covered. For example, there is an accepted link between the Spanish conquest of the Americas and the Little Ice Age in Europe and clear links to industrialisation and colonialisation. The creation of the WMO (World Meteorological Organisation) is an interesting counterpoint to the Cold War.

Existing links in **GCSE Religious Studies** tend to focus on environmental ethics and our stewardship of the earth. Further opportunities exist related to the role of particular charities or pressure groups within each of the major religions particularly in dealing with the impacts of climate change and in campaigning for climate justice and in the challenges of 'greening' major pilgrimages and festivals. Teachers have commented on the opportunity for significant improvements in the way this is currently taught and assessed, with the need for appropriate support for teachers.

Climate change is explicitly taught in **GCSE Geography**. Its potential breadth is reflected in the range of other suggestions from Expert Reviewers, with a focus on the need to link diverse topics within the specification to climate change e.g. urbanisation, ecosystems, food, hazards etc. There is scope for review and update of most geography specifications, particularly in the description of uncertainty when referring to the causes and impacts of climate change.

Past climate change features heavily in **GCSE Geology** but it is very much a minority subject.

In addition to explicit mentions of the greenhouse effect in chemistry and of photosynthesis and the impact of carbon dioxide and temperature on plants and ecosystems in biology, numerous and diverse parts of all **Science GCSEs** could be taught in the context of climate change through the use of appropriate examples, questions etc. It remains

generally true that, although many people think that the teaching of climate change is largely associated with science, it actually currently features in very few science lessons. There are many opportunities here for demonstrating to students that what they are learning is relevant to their understanding of climate change, its impacts and adaptation and mitigation opportunities. Beyond this, with a wide range of green careers in STEM, demonstrating the opportunities through the teaching of science is very important. While teachers were keen to follow the suggestions of Expert Reviewers, they would welcome support.

For example, in **GCSE Physics** links could be made from changes of state, energy changes in systems, temperature changes in systems, reflection/transmission of electromagnetic waves, blackbody radiation, energy generation and storage. Various renewable energy sources provide contexts for basic physical concepts.

Given how evocative art and music can be, raising the profile of climate change in these subjects could be a powerful way for students to explore their understanding of and emotions about climate change. Modern examples of pieces that could be studied in **GCSE Music** might include Einaudi's *Elegy for the Arctic* or *Trouble in the Water* by the Hip Hop Caucus. The natural world – if not climate change – features across most, if not all, genres of music. Students of **GCSE Art and Design** might be inspired by the so-called 'land' artists like Robert Smithson, Andy Goldsworthy, Anthony Gormley, and Ai Wei Wei, who are in the vanguard of those highlighting climate change and environmental issues.

Expert Reviewers identified many examples where the skills learned in **GCSE Mathematics** could be shown to be relevant to understanding climate change. However, teachers would find it helpful if they knew where to access relevant material such as data, graphs etc. and, as with all subjects, would need appropriate support and training. **GCSE Statistics** has even more opportunities for

teachers to use the context of climate change. Data collection, processing, manipulation, representation and interpretation can all be done with data or contexts taken from the social, physical and biological sciences.

As a result of this review, the RMetS is calling on subject associations, exam boards and all those involved in curriculum development and implementation to support teachers to make rapid use of some of these findings, through the development of teacher training and other support materials, high quality sample schemes of work, data sets, sample exam questions etc.

The RMetS has produced detailed reports for the opportunities for climate change teaching linked to the specifications from each exam board and to the KS3 National Curriculum. For access to these, please contact education@rmets.org.