Climate Change Curriculum Project Report 2023

Project Team

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1. Summary

There is recognition of a need to adapt Higher Education curricula for climate change education but there is little information available on how this is being done and what resources are needed. This project consists of a small study of University of London (UoL) programme directors to gain some insight into their views on a climate change curriculum which may be a new idea for them. They were asked to provide information on how (if at all) their programme considers climate change impact and mitigation and what resources and support they might need to develop their programme in the future. A list of open access resources was also developed by the project team. Two volunteer programmes offered to be case studies for developing climate change education drawing on the resources and one is reported here. The report gives an overall picture of the challenges of introducing a climate change curriculum particularly for distance education.

Aims

1. Explore how far existing non-environmental programmes at UoL and partners are adapting the curriculum (or would like to change it) in response to the climate crisis, not only by building in flexibility and sustainability in the programme design, but also through changing the content of programmes to include exploring the impact of climate change and identifying mitigating actions from their disciplinary perspective (e.g. economic, political, social impact).
2. Identify resources for curriculum development and explore their use in case studies with the aim of making the resources and case studies available to other programmes.

2. Literature Review

Climate change and climate change education

There is widespread agreement in scientific, political and university communities that climate change is a serious existential threat. We understand climate change to be a global socio-ecological crisis associated with the global heating caused by anthropogenic carbon dioxide production from burning fossil fuels, and the release of other greenhouse gases. Addressing climate change is one of the UN's key sustainability goals and intersects with other goals (Thew et al., 2021).

Universities have been concerned about sustainability for the past two decades. They have mainly addressed climate change mitigation, a concern with reducing the carbon footprint of individual universities by, for example, recycling and improved management of buildings and energy consumption (McGowan, 2023). But now the role of universities in facilitating climate education for all students is being explored.

The literature on the implications of the climate crisis for teaching in higher education is relatively sparse. It is perhaps indicative that a book on socially responsible higher education (Hall and Tandon, 2021) makes no reference to climate. However, there is now evidence of much greater interest in the topic (Alexander, 2023). In the UK COP26 provided an impetus for discussion and the COP26 Universities Network has produced a working paper on mainstreaming climate change in higher education (Thew et al., 2021).

Universities have been aiming to increase their energy efficiency for some time but mainstreaming climate change requires a more radical shift. Among recent publications several authors argue that effective engagement with the social, pedagogical, economic and ethical challenges of the climate crisis requires universities to break from the neo-liberal paradigm (Giroux, 2014). For example, Phelan and Lumb (2021, p3) argue that '*the pursuit of climate change mitigation and adaptation responses, grounded in commitments to equity and justice'* requires *'a renewed fundamental purpose for higher education'*. They identify a conflict between the idea of individualised private benefits that accrue from participation in higher education and the collective responses that are required to respond to the climate crisis. They also argue that universities should rethink how they relate to their communities. The emphasis on communities, plural, here is significant because for different institutions there will be different balances between local, regional, national, and international. McCowan (2021, p. 4) underlines the challenge, noting that '*climate change is rooted in the contemporary model of society and its modes of economic organisation, and so challenges fundamental aspects of humanity's beliefs and practices'*.

This emphasis on the need for radical transformation in university missions is not new. More than twenty years ago Stephen Sterling (2001) focused on higher education pedagogy, arguing that current educational approaches are mechanistic and reductionist, unsuitable for a world that is increasingly complex, interdependent and in which systems breakdown impinges on everyone's lives. In his view fundamental change to a sustainable educational paradigm is essential because without learning the future will be chaos. He suggested that policy and practice should shift from transmissive pedagogy to transformative pedagogy. He saw the former as instructive and imposed while the latter would need to be constructive and participative. Sterling's concern with transformative pedagogy has been taken up by a number of authors (Cey, 2020; Leimbach and Milstein, 2022; Kinol et al, 2023); Salinas et al, 2023, Sengupta et al., 2020).

Climate change education is thus a transformation of students as well as adaption of buildings and infrastructure. It is about:

> ..refocusing the educational mission of the institution to support students to develop the emotional, intellectual and practical capacities to live well with each other and with the planet in the era of climate change. (Facer, 2020p. 6)

Facer understands that this mission is hugely challenging for educators and students who will need to reflect on their emotional as well as practical responses to the risks of ecological and social disruption now and in the future. Specific areas covered by the literature on climate change education include a transformational pedagogy, interdisciplinarity and internationalization and we will discuss each of these below.

Many students will already be highly aware of climate change perhaps though activism. Grady-Benson and Sarathy (2016), writing about fossil fuel divestment in the US context, link student learning about the climate crisis to student-led organising. But the formal curriculum also has potential for climate change education.

McCowan (2023a) explores how teaching about climate change raises ontological, epistemological and axiological concerns. Ontological concerns include the connection between humans and the natural world and the existential threat of global heating. The history of contested scientific accounts of climate change including climate change deniers, and more recently delayers, demonstrates the epistemological questions that climate change education must raise. Finally, axiological questions about quality of life and values are raised by global climate injustice whereby countries that are most damaged by the climate crisis are mostly not the ones that generated the problem. All these challenges are drivers for the transformation of university teaching towards deliberation and critical reflection rather than knowledge transmission.

Climate change education is sometimes considered to be the preserve of geography and environmental science disciplines. However, one of the key messages from the COP 26 University Network (Thew 2021, p.1) is that of interdisciplinarity:

> The complexity of the climate crisis means all disciplines have a role to play in delivering education for the net-zero transition. Embedding interdisciplinarity is crucial to ensuring that our response to climate change makes use of all of the expertise HEIs have to offer and promotes knowledge exchange and integration for students and staff.

Climate change concerns politics, economics, sociology and psychology as much as it does the science. However, Leal Filho et al (2023; p.1) argue that:

> … HE has yet to fully articulate its contribution towards climate change challenges, which means that organisational structures, curricula and research programmes do not reflect the interdisciplinary nature of the climate crisis.

Finally, an emerging strand of research is concerned with the contradictory nature of internationalisation in higher education. Rumbley (2020) argues that the carbon emissions resulting from the movement of students studying abroad are comparable to those of a country like Tunisia.

However, McCowan (2023b) points out that internationalisation has a complex relationship with climate change mitigation and action.

> Student and staff mobility bring great benefits for the individuals involved and knock-on positive benefits for society, but are unsustainable in their current formats and levels. (McCowan, 2023b p.582)

In addition, the balance between online and in-person teaching is still evolving post-pandemic but wholly distance provision is not the preference for many students. The conundrum is that although distance education may be more sustainable, the opportunities for climate change education may be reduced without campus learning. McGowan (2021) proposes three locations for climate change education at universities: formal curriculum, campus, and community. For distance and online learning students the opportunities for meeting on campus are not usually available so incorporation of climate change into the curriculum is essential.

Programme leaders and lecturers are becoming caught up in these debates about how to adapt and transform the curriculum as calls for a climate change education in higher education grow. 'Climate change engaged' schoolteachers, who are mostly self-taught, have been identified (Greer et al. 2023) and the curriculum development (formal or informal) is inevitably left to such individuals. These may or may not be environmental science specialists. Similar climate change engaged individuals are expected to exist in HE too but how far this expertise extends across disciplines is not known. As well as being emotionally and politically charged, climate change is embedded in uncertainty as knowledge is constantly updated so it would be no surprise if many teachers (and institutional leaders) shy away from including it in their curricula.

Thus, more research about how higher education curricula are evolving, or might evolve, to address the climate crisis is urgently needed. Case studies of climate change education are hard to find particularly for distance learning. This study will explore the extent to which programme directors in a range of non-environmental science disciplines at a distance learning institution are teaching about climate change and how they are doing this and how they would like to develop their practice.

3. Methodology

To gain a broad overview, an online survey tool was developed in three distinct sections to explore existing understanding of climate change education and institutional position, understand the process and practical experiences of integrating climate change in the curriculum and finally gaining the perspective of educators on the potential of what more could be done on climate change education.

All distance learning programme directors at UoL were sent an anonymous email survey and 11 responses were obtained from a range of disciplines including Business studies, Arts, Law and Biological Sciences. The survey included both qualitative and quantitative responses. Respondents were also invited for a follow up interview to explore whether they would like to offer their programme as a case study and to consider use of a set of online resources. A confirmation of interest in resources resulted in the project team developing a document listing climate change resources of a suitable higher education

non-expert level that were freely available and where relevant with a creative commons licence (see appendix).

Interviews (up to 1 hour) with 3 programme directors (in divinity, economics and business studies) who were interested in a follow up were conducted online, transcribed, and coded. Two of the programme directors were keen to trial the resources and offer their programme as a case study for climate change curriculum development. Meetings were held to discuss how they might develop their programmes in Autumn 2023 and to evaluate the resources.

Results from the survey and interviews were combined into a set of themes and recommendations for UoL and other universities were proposed.

Ethics

Ethical approval for the project was obtained from the University of London and included the following points.

- Climate change is a politically and emotionally sensitive issue and survey questions will recognise this. The survey will be anonymous, and the data will be stored securely on a UoL sharepoint site for which only the research team has access. Reporting will also be anonymised although disciplinary areas will be recognisable. Participants will therefore be sent drafts of any reports or publications and given the option of removing their results from any publicly available reports or publications if they wish.
- Participants in the case study will be informed that materials from their programme and a summary of the pilot will be made available to other staff at UoL and its overseas partners but that individuals will not be named unless permission is given. Those staff involved in the case study will be invited to present their findings jointly with the research team and will be credited in any publication.
- International perspectives may vary so there are risks of third parties such as students being unhappy with changes to the curriculum. Students and staff involved in the case study of curriculum change will also be invited to express concerns, and if any assessments or resources are deemed to be problematic, students will be offered alternative assessments or a possibility of opting out of any controversial or sensitive aspects of the climate change curriculum. However, it is recommended that where possible students engage with controversy as a preparation for an unstable and potentially difficult future.

4. Findings and Discussion

Preliminary themes

The results of both survey and interviews were fairly consistent, and a key feature was agreement that programmes should include climate change, at least to some extent; but there was uncertainty about how to include climate change in the curriculum. There was also some recognition that there might be some differences between distance and campus education in implementing such a curriculum. The following themes were identified and will be discussed below:

- Uncertainty about who is responsible for climate change education and the need for guidance from the institution on the curriculum
- Varied practice in addressing climate change in the curriculum
- Can content on climate change be incorporated without conflict with discipline content?
- Uncertainty about student expertise and activism in climate change
- Differences between campus learning and distance learning for delivery but not content
- Identifying resources and rewriting courses/assessments are challenging and time-consuming.

Uncertainty about who is responsible for climate change education and the need for guidance from the institution on the curriculum

On sector or university steer

All participants agreed that universities are responsible for climate change education. In the survey, 54% of responses indicated that universities shared a 'high responsibility' and the remainder, 46%, indicated 'some responsibility' in preparing students for a future life of global heating. However, this was not necessarily about adapting the curriculum and when describing the policies already in place participants referred to travel policies and operational management initiatives to reduce emissions; only a minority mentioned climate change literacy as part of teaching.

Nevertheless, all agreed with the statement that: 'Interdisciplinary / transdisciplinary learning on climate change, mitigation and adaptation should be built in as part of the curriculum' at least to some extent. However, one respondent said that by the time a student studies at university level the influence is too late and suggested that 'the target group and curriculum should be primary and secondary schools'.

The Programme Director for the MBA argued that 'universities should lead on climate change curriculum' and suggested that 'climate issues should be present in all modules – integrated with topics and issues – because they are an important factor in the world in which managers operate'.

Another interviewee was less sure that all disciplines should address climate change becuase:

> ..that would be like having a national curriculum for universities, like the national curriculum for schools in the UK. It might be particularly difficult to address climate change in some subjects – the study of music, or textiles, for example. But, on further reflection, even in these subjects, one could write songs about climate change, and climate change has an impact on the production of textiles.

Thus, although there was general agreement that the curriculum should address climate change, for the programmes surveyed, the responsibility seems to lie with programmes, and the role of a university steer towards a climate change curriculum for all is uncertain.

Varied Practice in addressing climate change in the curriculum

When reporting on actual practice, 73% of programme directors actively promoted reflection or discussion on climate change either formally or informally.

Table 1: Active Promotion of student discussion or reflection on climate change in your curriculum

No	Yes formally e.g. as part of a taught subject	Yes informally	Total Yes
27%	37%	36%	73%

In some cases, the entire curriculum is based on sustainability/climate change, whereas in others, elements of climate change were included in all modules, or there were targeted modules on climate change or references to climate change in some topics. One interviewee said that climate change should definitely be included in all modules and that the ethics of growth based on consumption are very challenging for the long term future of the planet. They also suggested that there should be an optional module which does not overlap with the content of other modules but provides extra content for those who wish to study the subject in greater depth and for whom this will improve their employability.

Another programme already had several optional modules which included climate change, either as a topic or as part of a topic. But the director stated that 'the programme also has an introductory module and it would be possible to redevelop this to include the impact of the subject on climate change as one of the topics. Since this is a compulsory module, this would ensure that all students on the programme understand key points concerning climate change.'

Can content on climate change can be incorporated without conflict with discipline content?

We have reported so far that those who volunteered for interviews were not surprisingly already including climate change in their curricula, but when asked if they encountered any conflict between their discipline and the debates on climate mitigation and adaption, all three answered "no". One participant said that, if done properly, there should be no such conflict and that one purpose of education is to help students to understand reality and that understanding climate change is part of our reality. The values of both large businesses and small companies should be questioned and, if their actions are contributing to climate change, their values will need to change.

This participant recognises the axiological implications of climate change for business values and ethics which could be controversial. Another interviewee was not concerned about controversy over climate change, however, and argued that there is '… no conflict between the unwritten assumptions of the curriculum and focusing on climate.'

A third interviewee agreed that there was no clear conflict between content on climate change and discipline content, although it might be challenging to ask discipline specialists to teach content on climate change. The interviewee explained that 'even in a Divinity programme with academic staff who are not experts in climate science, I think we can still consider what the scientists are saying and the implications of that, and how the values taught by the world's religions can contribute to the discussion and to practical action.'

Uncertainty about student expertise and activism in climate change

The survey indicated uncertainty about student expertise and activism:

- 72% of educators are not sure if their students are participating in climate change activities voluntarily at university.
- 81% of educators are not sure if their students are participating in climate change activities outside of university.

There could be a difference between the campus and distance learning students here. One programme director remarked:

> I don't know about distance learning students much, but the students on campus, I know that a lot of them are really interested, and they're really aware of all the challenges, … But not everyone; it's a minority of students who are really … care. But it really helps when they (are) given an assignment which is linked to greenwashing.

It also seems to be more difficult to find out the background of learners at a distance. Another programme director said:

> We don't really have any clear means to find out (what expertise or experience students have with climate change); we have, in the past, asked for information about students' backgrounds but we don't currently have access to that and it would be useful to know.

Distance learners from some parts of the world are acknowledged to have challenges to their study which include reliable internet access, but there was also recognition that international students might have direct experiences of studying in difficult circumstances triggered by climate change. For example, one programme director noted that 'climate change is said to contribute to political conflict and mass migration and some students on our programme live in countries affected by these.'

Another difference between campus and distance students was the challenge of engaging distance students in discussion using online pedagogies and we explore this next.

Differences between campus learning and distance learning for delivery but not content

An interactive pedagogy with social learning (Silva-Fletcher & Thuranira-McKeever, 2023) would seem essential for online climate change education with its controversy and complexity, and discussion between students and between students and tutors would be expected. While programmes at the UoL are expected to include student discussion online this is not always straightforward. One programme director explained:

> **…** the way we teach (distance learners) is in at least some respects different from the methods which would be used to teach face to face in a classroom, but I don't think the content is affected by the delivery…… we have discussion forums for every topic and we recently made contributions to the discussion forums a small part of the assessment. Students are required to contribute to three of the ten discussion forums in each module, but some struggle because they see it as another time-consuming task. By contrast, in a classroom with a two-hour teaching period, you could incorporate several ten-minute discussions and that would be easier.

This is in keeping with McCowan's (2023a) view that a long overdue transformational pedagogy is required for climate change education at university level. Facilitating learning groups is also a challenge for distance learning pedagogy and it might be more difficult to deal with reticence or spontaneity in an online classroom compared to on campus.

Rewriting courses/assessments and identifying resources are challenging and time-consuming.

Lack of interdisciplinary expertise was not mentioned as an issue but lack of support from the institution was noted. For example, one programme director observed that, although they are enthusiastic about including climate change in their curriculum, no institutional support for this was available.''

It seems that these climate change engaged lecturers will develop their own expertise. Alternatively, they might seek help elsewhere. One programme director did have sufficient resources to invite visiting specialist speakers to address the interdisciplinarity of climate change education.

Another challenge is that online learning materials often have to be prepared some time in advance, often by a team of experts including disciplinary expertise, pedagogic and technological expertise (Baume and Phillpot, 2023). This makes reviewing and adapting the curriculum difficult and time-consuming, particularly for programmes with large numbers of modules and teaching staff. A programme director explained:

> The teaching and the delivering and preparing is (challenging) because everything is already prepared (in advance). So, to prepare the new courses that will take extra time and also, like discussion points (for students) would be a really, really relevant (for climate change education).

Thus, the pedagocial transformation outlined earlier for climate change education may be more difficult to address in practice for distance education.

Teaching climate change would require identifying new, possibly interdisciplinary, resources, and here there was interest in help with identifying resources; 72% of survey responders indicated that they would be interested in exploring general resources and/or examples of how climate change is addressed in the curriculum in their discipline. The interviews provided some more detail on this. For example, one programme director said that:

> It would be helpful to have a list of short readings which would enable students in a non-science discipline to get to grips with the key elements of climate science without having to read a whole book or several articles; as independent part-time learners, they don't have time to do a large amount of reading in additional to the reading within their own discipline.

The case study below was developed between the project team and two members of the Divinity programme to explore how open access resources might be useful.

Case Study: Including climate change in the study of religion

The University of London's online Divinity programmes consist of a relatively small group of undergraduate level programmes. The programme director and a module leader took part in the climate change curriculum project and offered two modules as case studies for the use of climate change resources. These modules were 'Religion and Ethics' (Level 5) and 'Religion and Science' (Level 6). The two staff were given the list of climate change resources and interviewed about their plans. The module leader produced a table outlining their plans and commenting on the usefulness of each resource. Over the next academic year, this module leader thought that these resources could be utilised in the following ways:

- For staff/faculty - to help them to initiate relationships, e.g., with climate scientists, journalists, or organisations (e.g. the RSA) and organise lectures or one-off panel events on sustainability and online learning, or religion and sustainability/climate change, etc.
- For students - as supplementary resources for different levels of study and/or careers searches, shared on the VLE
- For public engagement – e.g., through our Facebook or LinkedIn pages.

The University College London link to resources is useful but is somewhat focused on the UN Education for Sustainable Development goals in general. It could be used to create a survey and disseminate to staff and students to gauge their needs and evaluate how UoL Divinity is doing in climate change education and sustainable development, perhaps drawing in other humanities programmes. The aim would then be to write up and publish the survey results as an article/blog post in a relevant journal, e.g., Times Higher Education Supplement or The Conversation, supplemented with a short seminar/webinar.

The Religion and Ethics module has a topic on religion and the environment which currently considers the ethical implications of climate change. The plan for the module is to include some links to videos and other materials on climate change and to make some small changes for the next academic year. However, the curriculum is already quite crowded so there is not much space for additional material. Adding too many things to the religion and the environment topic might unbalance the other 9 topics.

At level 6, The module leader for Religion and Science was already planning to include more on climate change in his module before taking part in the research, but formulated more detailed plans for the current year after taking part in the study. These plans included the uses of the climate change resources and links. The module already contains essential and additional reading materials that include references to climate change and climate science (including references to religiously motivated climate change sceptics), among other topics such as Artificial Intelligence, robotics, and life extension technologies. It is a third-year module and students select a topic to look at in depth so these additional resources will be helpful for detail on climate and/or environmental science and skepticism.

A dissertation option on religion and climate change is now available for students who would like to explore the topic in depth. Links to the videos will be put on the VLE to provide ideas for dissertation topics. The videos were considered to be very good, especially the Professor Kevin Anderson video. Links to the University and Colleges Union and the OER Creative Commons resources (albeit US centric) were also helpful and will be made available to students for dissertations.

Another possibility would be to introduce a dedicated module on religion and the environment if funding could be found for the development work. This module would be able to provide much more

detail and could provide a good foundation for students wishing to research the interaction between religion and climate change in their dissertation. If it were possible to make this module available as a standalone module, and for students on other programmes, this might become financially viable.

However, the tutors recognised that some of these plans might be ambitious and not implemented in the short term. The programme Director was also concerned about work overload for students if new material is added. The UoL processes for updating distance programmes means that the substantial changes require a lengthy approval process and must be published in advance so that is why planned changes are small changes that can be added to the existing programme without formal revision of the programme.

In conclusion, the relevant and accessible resources list generated by the project are helpful for making small tweaks to the modules that offer students opportunities to explore climate change issues. This is a useful starting point. However, a vision of further development such as a new Religion and the Environment module, or visiting speakers and panel events, will require more planning and consideration of programme development processes and funding.

5. Recommendations

1. Enable materials development teams to work with Programme Directors to address climate change education in new programmes, and when programmes are revised/refreshed. This might include an audit of where climate change is addressed in the curriculum. Simplifing a process for teaching staff to make small changes e.g. by using editable PDF files might also help.

2. Learn from case studies of climate change education at the university by making these visible and encouraging climate change education development for teaching staff and distance learning design teams.

3. Make resources for climate change education freely available through the university library and through use of open-source materials.

4. Encourage pedagogies for climate change in distance education which provide students with opportunities for critical debate and problem-solving, building on students' existing experience of and emerging expertise in climate change.

5. Consider ways in which distance students can share modules from other programmes to promote interdisciplinarity and take part in extra-curricular activities on climate change.

6. Set up a team to write and implement a sustainable development/climate change education strategy (longer term).

6. Conclusion

Although small in scale, this study supports what Leal Filho et al. (2023) have argued, that universities are not prepared for climate change education in their structures, curricula, or staff support. At present

the question of programmes adapting and developing their curricula to address sustainability and climate change has not really been considered although there are staff who are already climate change engaged leading the way. The views of students on climate change curriculum also seem to be unknown. The extent to which those in charge of modules and programmes are considering the readiness of students for a climate change future is also likely to vary. From the tentative findings of this small study, the challenges that have been identified for introducing a climate change curriculum in Higher Education include a lack of institutional guidance and strategy for climate change education as well as support needed for interdisciplinarity and new pedagogies which are particularly important for distance students who may not have opportunities to engage with climate activities outside the curriculum. Transformation of student and staff beliefs and practices (Cey, 2020; McCowan, 2023a) will likely need to be far-reaching for distance education with its reduced opportunities for engagement and difficulties in adapting or updating the curriculum at short notice.

The complex impact of climate change is unique as it is simultaneously global and individual, demanding a formal and informal behavioral change. At a university level, a deliberate effort to engage students and create dialogue about climate change alongside individual non climate related subjects of study is undoubtedly challenging, but leadership are well positioned to encourage a framework for change, an opportunity to innovate and create in an interdisciplinary space.

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Appendix

Resources to support the integration of climate issues in the curriculum.

Several respondents to our survey on integrating climate issues in the curriculum noted that finding useful and relevant material is a challenge. There is a large and rapidly growing body of resources online, but this is part of the problem. How can educators find, choose, and integrate appropriate good quality material when the pool of resources is so large, and time is limited.

In this short briefing we have curated links to two kinds of resources. Firstly, a set of openly available videos that might be useful in providing a broad overview of the climate crisis. Secondly, links to a small number of easy-to-use sites that host curated collections of resources. In both cases the resources were selected using three criteria – ease of access, credibility, and openness. The emphasis is on openly licensed resources (OER) and in an Appendix we provide a short guide to the affordances of using openly licensed material (Creative Commons).

The links are to trusted and good quality sites that have longevity. We have focused on OER because open licenses allow educators to share the material with colleagues and students without fear of infringing copyright and (depending on the nature of the open license and subject to appropriate attribution) to integrate material into curricula in either its original or reworked form.

It should be noted that climate change is both a product and a driver of global inequality. Most online resources are created in locations and from perspectives that tend to marginalise voices from the global south. This is true of many of the resources highlighted here. It's important that the distortions that this creates are made explicit to students and that learning design encourages a critical and reflective approach.

Videos:

A short list of openly accessible videos that address key issues in the climate debate.
The purpose of including these videos in the resource are to allow educator to inform and stimulate the start of a discussion.

Climate Change Talks: a longer talk by Professor Kevin Anderson that looks at transition, social justice, mitigation, and impact – 59.33mins
https://youtu.be/na1aHtv0OKI
This video is clear and comprehensive and includes enough science and technical information without it becoming too burdensome. There is a clear and consistent climate justice framing. It is, however, pre-Covid, pre-COP26 and pre the 2013 IPCC synthesis report. The IPCC has produced a summary of its latest reports that is a good complement to Kevin Anderson's talk.

https://www.youtube.com/watch?v=YIFCSZYU2LM

The Paris Agreement: a two-minute video from the United Nations on the Paris Agreement which was signed at COP21 in 2015 – 1.39mins
https://www.youtube.com/watch?v=5THr3bFj8Z4_
Good as a discussion starter. It could usefully be supplemented by the IPCC video included at the end of the previous paragraph.

The carbon cycle is key to understanding climate change: a short video from the Economist that explores the carbon cycle and how the use of fossil fuels has disrupted the long-term equilibrium of the cycle – 7.43mins
https://youtu.be/yhlg9txl7yM
Useful for starting a discussion. It introduces a different way of framing the discussion using the concept of sources and sinks and is clear on fossil fuels and human action.

Planetary boundaries: a four-minute discussion of the concept of planet boundaries and how climate intersects with the other eight boundaries. Just under 4 minutes. This video is useful for introducing the concept of planetary boundaries but omits other important issues.
https://www.youtube.com/watch?v=Mpv6aPFhr80

Climate change and the future of humanity: an animation by David Wallace-Wells published by the RSA – 4.5mins. This video focuses on the consequences of global temperature rises. An attractive and well-presented video but doesn't provide much of an analytical framework and less useful as a discussion starter.
https://www.thersa.org/video/animates/rsa-minimate/2020/climate-change-future-humanity

OpenLearn

OpenLearn is a site provided by the Open University (UK) that hosts OER resources. The material is catalogued by subject area and there is an effective search tool. You can browse material without signing into the site, however, to try out the assessments that form part of some of the short open courses you (or your students) will need to set up an account. This simply requires providing a valid email address. When you locate a resource, you will find that there is always information about which form of Creative Commons license applies.

This link takes you straight to climate resources on OpenLearn:
https://www.open.edu/openlearn/local/ocwglobalsearch/search.php?q=climate

As of May 1st, 2023, OpenLearn hosted:

1. Five short courses
    - Climate change
    - Climate justice for the next generation
    - Climate change: transitions to sustainability
    - Could we control our climate?

- Climate change: island life in a volatile world

2. Several hundred articles on a wide range of climate related topics.

3. More than 80 videos.

4. More than 50 audios tracks.

5. A small number of resources that support structured activities.

Amnesty International

A good, reputable resource the integrates experiences from different parts of world.
https://www.amnesty.org.uk/education-resources-climate-change_

University and Colleges Union (UCU)

The UCU has an excellent website that provides links to resources for climate learning, organised in several topic areas. The resources collected under the different topics range from case studies to academic papers and ideas for activities. Most, but not all, of the resources linked to are openly licensed.

You can go straight to the resource page via https://climatelearningresources.org.uk

OER Commons

OER Commons is a US based site that aggregates open educational resources. As of May 1st, 2023, the climate section includes material for higher education organised in 4 subject areas:
Climate Education: Communications – open textbooks, full courses, and a course design (7 resources)
Agriculture and Climate – case studies, full courses, and a course design (9 resources)
Social Science and the Impacts of Climate Change - open textbooks, full courses, activities, and toolkit materials (14 in all)
Climate Change and Public Health – 3 case studies and an open textbook
Environmental and Climate Science – a range of open textbooks, full courses, and toolkit materials (19 in all)
Engineering and Climate - 12 full courses from Delft University of Technology

All the resources on OER Commons are catalogued with a clear statement of the open license that is ascribed to the material. Some of the resources are US-centric.

You can access all these resources via https://www.oercommons.org/hubs/climate#higher-education-climate-resources

Education for Sustainability at the University of London

University College London has developed a toolkit on embedding sustainability in your teaching and learning. While the remit of the toolkit focuses on the Sustainable Development Goals there is lots in it which is relevant. The toolkit covers:

- What is Educational Sustainable Development (ESD)?
- Why does ESD matter?
- How to embed ESD into your teaching
- Opportunities for embedding ESD
- Key takeaways
- References and further reading

Open University UK Library

Almost 300 resources on sustainability. The resources are split into five categories:

- Long-term thinking: to help us think bigger and invest in our planet's future
- Prevention: there is a lot we can learn to prevent further damage being done
- Involvement: how and why should we make changes in our daily lives
- Collaboration: the power of working together and involving all kinds of people
- Integration: new approaches that ensure the longevity of the human race and planet Earth

https://www5.open.ac.uk/library/library-resources/sustainability

An interactive map on climate change from the world bank (climate knowledge portal) can be used to

- Learn about climate at the global, national, sub-national and watershed levels.
- Enhance knowledge on climate change related topics, including exposure, vulnerability, sectoral impacts, and adaptation options.
- Assess, visualize, and download resourceful climate data and information

https://climateknowledgeportal.worldbank.org/overview

Using Creative Commons

All forms of Creative Commons licenses are prefixed by the letters CC. In this taxonomy Public Domain material is described by the tag CC0 (CC Zero). Under CC0 creators give up their copyright and put their works into the worldwide public domain. CC0 allows you to use the material, distribute, remix, adapt, and build upon the material in any medium or format, with no conditions.

There are six Creative Commons licenses which allow open use and distribution with a range of qualifications. The most permissive license is CC BY which, providing you give attribution to the originator, allows you to use and distribute the material, edit, and combine it with your own material (remixing), and even allows the new material to be exploited commercially. License descriptors that include NC mean that derivative material must not be used commercially; SA (share alike) requires that derivatives are published under the same CC license as the original, while ND (no derivatives) means that while the material can be used and reused and freely distributed it cannot be modified.

A full and straightforward explanation of all the licence types is given on the Creative Commons website

Questionnaire

Preamble

Climate change is increasingly impacting on human lives and is one of the most serious challenges for the future. Universities are widely recognising their role in adopting and promoting carbon neutral goals and practices. However, in teaching and learning:

- What is the relevance placed on climate change education?
- Is there dynamic recognition / repositioning of higher education curricula (beyond subject specific silos) to mitigate and adapt for a sustainable future?

This questionnaire is designed to understand how far higher education is engaging and is set up to prepare future generations for climate change mitigation and adaptation and promote sustainability for energy, food supply, human activities (e.g. travel) and the environment. In the questionnaire there is a recognition that formal discussion of climate change may already be part of certain science, geography and earth science subjects. However, it also attempts to explore inter and transdisciplinary opportunities and challenges, preparedness of programmes and educators to consider and inform practices to provide every student with the required knowledge, tools and values to reduce their own impacts and beyond.
This questionnaire will take you at most 15 minutes to complete. All your information will remain confidential, as indicated in the information sheet. It has three parts:

1. Presage: where we explore your understanding of the institutional engagement in climate change / climate crisis/ climate action

2. Process and practice: where we ask about your experiences / challenges to integrate climate change within the curriculum?

3. Potential: where we explore what can/ needs to be done to include climate change education? What is feasible?

All information that could identify you or your institution will be kept confidential during the data collection and then anonymised for the analysis and dissemination. The survey responses/interview recording will be stored within a password protected device and destroyed a year after the interview. The researchers will only share or publish anonymous information that cannot be tracked to you or your institution with the exception of: a) listing your institution as contributing to the research and b) using the institution name with specific examples of practice only where additional permission has been sought. All information will be handled according to the terms of the General Data Protection Regulation and Data Protection Act 2018.

Presage: to explore your understanding of the institutional engagement in climate change / climate crisis/ climate action

1. What is your discipline area? (please select one of the following) [list of options].
2. Would you describe your role as: [list of options].

3. As an educator in a higher education programme, please indicate your views/ agreement on each of the following statements: Likert scale of: 0-Not sure, 1-Not at all , 2-Somewhat/ maybe and 3-Yes, definitely

- Climate change should be part of all teaching and learning activities, irrespective of subject area.
- Interdisciplinary/ transdisciplinary learning on climate change, mitigation and adaptation should be built in as part of the curriculum.
- Students are keen to learn about climate change and sustainable futures in my subject area.
- Climate change is likely to be disruptive and programmes should prepare/ invest to adapt to potential disruption.
- HE curriculum that Integrates sustainable development for the future should promote climate change action (skills, knowledge, values and behaviour).

4. Does your institution have a policy/strategy that covers climate change as part of its sustainability or carbon neutral action? (please indicate all the applicable answers)

   If yes, briefly what does the policy/ strategy cover?

5. Has there been a direct impact on the teaching and learning on your course due to climate change over the last years (excluding impact of Covid).

   If yes, can you share examples of what was the direct impact on teaching and learning.

Process and practice: What are your experiences / challenges?

6. Do you actively promote student discussion or reflection on climate change in your curriculum?

If yes, please outline how you encourage discussion.

7. Would you like to include some, or more, student discussion or reflection on climate change in your curriculum?

If yes, please outline what this might include.

8. Do you include scientific information (knowledge) on Global Heating in your curriculum?
   If yes, please outline some examples of what you do or would like to do e.g. as real-world case studies, critical appraisal of articles or research, vignettes etc

9. Do your students explore climate crisis problem solving/ adaptations/ interventions in your curriculum?
   If yes, please outline how the problem solving is included.

10. On a scale of 1 to 3, where 1 is least important and 3 is most important, what would you regard as the main challenges for including Climate change mitigation and adaptation as part of your curriculum?
    - Lack of time within the curriculum
    - Integrating relevance subject area learning outcomes

- Lack of training for educators in climate change action
- Lack of understanding and value for climate change action amongst educators/ subject experts
- Lack of appropriate teaching resources on climate change relevant to the subject area.
- Lack of enthusiasm amongst students for climate change action
- Lack of enthusiasm amongst educators for climate change action

11. Do you include some or more interdisciplinary/ multidisciplinary working on climate change in your curriculum?

    If yes, please outline which disciplines you might work with e.g. science, economics, politics, geography, statistics, public health etc.

12. Do your students take part in climate change activities voluntarily at university?
13. Do your students take part in climate change activities voluntarily outside of the University?

Potential – Exploring what can/ needs to be done to include climate change education? What is feasible?

14. What responsibility do you think higher education should have for preparing students for a future life of global heating?
15. What responsibility do you think higher education should have for preparing students for careers relating to global heating?
16. Who do you think should take the responsibility for engaging with climate change education within your setting?
17. Would you be interested in exploring resources or examples of how climate change is addressed in the curriculum in your discipline?
18. Would you be interested in exploring resources or examples of how climate change is addressed in the curriculum in other disciplines?
19. Would you be willing to take part in a short online interview a to discuss your experiences / challenges to promote climate mitigation and adaptation and identify resource needs.