

Climate Classrooms at the AMOS National Conference

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Australian Research Council's Centre of Excellence for Climate Extremes School Resources Developer Sanaa Hobeichi working on assembling teams for the workshop.

Climate Classrooms is a joint project of the ARC Centre of Excellence for Climate Extremes and the Monash Climate Change Communication Research Hub. It has two main aims. Firstly, it aims to raise the profile of climate science in secondary school Science, Technology, Engineering and Mathematics (STEM) subjects. Despite having the name 'climate science', this topic often has a much lower profile because it sits under geography, which is not classified by schools as STEM. This can lead to a misconception among students that they do not need STEM skills to pursue climate science at university. It also means a lack of awareness among STEM students that their passions and skills can be applied to climate science, to the detriment of the field. However, Climate Classrooms is not only concerned with STEM subjects. It aims to build the

climate science literacy of students in other subjects too. This contributes to empowering the upcoming generation to make well-informed decisions related to climate change.

The approach taken by Climate Classrooms to bring climate science to the classroom relies on workshops in which school educators and climate scientists work together. Participants develop draft educational resources using examples from climate science to address objectives of the Australian curriculum. The Climate Classrooms Team then works to develop some of the content generated by the workshop into fully-fledged teaching resources aligned to the Australian curriculum, which are made freely available at <https://www.monash.edu/mcccrh/projects/climate-classrooms>. The team also works with TROP ICSU (Trans-disciplinary Research Oriented Pedagogy for Improving Climate Studies and Understanding), a global project funded by the International Council of Science, to contribute to a repository of educational resources on climate change that can be used worldwide.

The AMOS National Conference provides an ideal forum for the Climate Classrooms workshops. The inaugural workshop was held at the AMOS 2020 conference in Fremantle, Western Australia. It involved over 60 participants, mainly climate scientists from the conference and secondary school teachers from the Fremantle and Perth area. It has so far resulted in the release of three lesson plans. The successful model of the Fremantle workshop was replicated at this year's AMOS conference in February. The conference was held online due to the COVID pandemic, so the associated Climate Classrooms workshop took the form of a half-day event run via Zoom.

Workshop participants fell into three broad categories. Firstly, there were 16 climate scientists and knowledge brokers from UNSW, Monash University, University of Melbourne, CSIRO and the Bureau of Meteorology. These ranged from PhD students to professors. Secondly—and most importantly—the workshop was attended by 30 school educators who were all passionate about enriching the teaching of the curriculum with examples from climate science. These were mainly teachers, ranging from pre-service teachers to deputy heads and assistant principals, but also included representatives of curriculum authorities.

Although the online format presented some challenges, it allowed educators from across the country to take part. Finally, the workshop was joined by guests from National Computational Infrastructure (NCI) and the Australian Data Science Education Institute, who were seeking avenues to promote the use of data by school students.

Prior to the workshop, those registering were put into ten teams, each containing one or two climate scientists and two to four educators. Each team had common interests. For example, educators interested in teaching Maths to school Years 7–10 were grouped together, as were those interested in teaching Earth and Environmental Science to Years 11 and 12. The workshop itself began with a welcome by AMOS President Angela Maharaj, an experienced academic and enthusiast for climate science education in both schools and universities. Sanaa Hobeichi, a researcher and school resources developer with the ARC Centre of Excellence for Climate Extremes, then introduced the format of the workshop. The lion's share of the remainder of the workshop was devoted to the different teams working in different Zoom breakout rooms and focussing on different parts of the school curriculum. This involved finding links between climate science topics and specific parts of the curriculum, considering how existing online climate science resources (e.g. videos, interactive maps, documents, data, online climate models) could be used to elucidate these and generating ideas for new educational resources.

At the end of the workshop, each team had packed a Google Drive folder full of fantastic ideas for incorporating existing online climate science resources into new educational resources to meet learning goals in the curriculum. For example, one team drafted a Maths investigation on interpreting and presenting data that uses global mean temperature, sea level rise and atmospheric carbon dioxide data. Another team drafted a Year 10 Science lesson plan that uses climate data to address misconceptions in climate science. Another drafted a Year 7 Science unit involving analysing climate data to investigate natural and anthropogenic variations in climate.

The workshop provided a unique opportunity for secondary school educators to work closely with climate scientists and each other to identify existing climate science resources that can help integrate climate science into the Australian curriculum. It also allowed them to make sure that ideas for new educational resources on climate science aligned well with the school curriculum and could be used in practice. When asked what the best part of the workshop was, the educators highlighted the direct collaboration with practising climate scientists, getting inspiration from other school educators, the focussed teamwork in the Zoom breakout rooms and gaining an awareness of available existing climate science resources. For example, one teacher commented:

"I found the Climate Classroom workshop invaluable. As a Science teacher, I know how important it is for students to gain an understanding of both the mechanisms of climate change and implications of this on their own future. Working with other teachers as well as experts in the field allowed me not only to collaborate in making a useful lesson plan but also opened my eyes to a range of resources already available. I was able to take knowledge of these resources back to my science teaching colleagues who are already using them in lessons."

—**Katrina Holewa, Science Teacher, Noosa District State High School.**

Importantly, for many of the teachers, the workshop was endorsed by the NSW Educational Standards Authority (NESA) as officially contributing to their professional development.

Feedback from the workshop shows that the scientists who participated were passionate about climate science education and that they were struck by the enthusiasm of the educators to bring climate science to the classroom. For example:

"One of the reasons why I am pursuing a PhD in climate science is because I want to improve the climate literacy of the general public. During the Climate Classrooms Workshop I worked with three teachers to develop a lesson plan for Year 9 Geography. We discussed effective ways to teach concepts on climate change and food security. The teachers I worked with showed a lot of enthusiasm and interest to incorporate climate science into the school curriculum and that made the experience all the more rewarding for me. I am very happy that I participated in this workshop and was able to contribute in some way."

—**Charuni Pathmeswaran, PhD student, UNSW.**

"I am passionate about teaching, because to me it represents how we nurture and guide future generations. What could be more important?"

It was so great to meet these equally passionate secondary teachers and to facilitate the passing on of some knowledge directly using real-world scientific data and tools.

We have great mutual respect for each other's expertise, and I hope this is a blueprint for future collaborations between professional scientists and school teachers.

This is an important way for us to continue to break down the barriers which separate facts and data from deep knowledge and understanding."

—**Benjamin Henley, Lecturer, Monash University.**

The scientists clearly appreciated the opportunity to reach beyond the research community and make their science accessible to secondary school students, the decision makers and potential climate scientists of the future.

Please follow the Monash Climate Change Communication Research Hub on Twitter or Facebook to keep up to date with all things Climate Classrooms. The Climate Classrooms Team welcomes engagement with the readership of BAMOS, including feedback, questions and ideas, and can be reached via mcccrh@monash.edu. This email can also be used to express interest in future Climate Classrooms workshops.

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The success of the workshop relied on the time and enthusiasm of the participants.