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Youth perspectives on contributions to the *SSR* special issue: science education in the context of the climate emergency

Elizabeth Rushton and Lynda Dunlop with youth panel

Abstract The articles included in this special issue of *School Science Review* raise a number of implications for science education. In this article, we find out how 16 young people in England respond to the findings presented. They discuss the importance of teachers and schools, and of all contributions to climate education, and share an appetite for more, earlier, climate education that uses experiential approaches and is not limited to science.

A central purpose of this special issue, and of our work more broadly (Dunlop *et al.*, 2020; Rushton *et al.*, 2021), has been to foreground ways for young people and teachers to work across intergenerational boundaries in the context of education for environmental sustainability. These intergenerational opportunities are vitally important in the context of climate change education as the key stakeholders, young people, teachers, school leaders, parents, researchers and policymakers are drawn from different generations. Therefore, to provide an opportunity for school students to respond to the articles on the climate crisis in this issue of *SSR*, in October 2021 we each held an online workshop with school students. The first workshop took place with nine year 7 and 8 pupils and their teacher, Meryl Batchelder, at Corbridge Middle School (facilitated by Elizabeth Rushton), and the second with seven year 12 pupils and their teacher, Helen Clarke, at Archbishop Holgate's School (facilitated by Lynda Dunlop).

In our introduction to the workshops with school students, we explained that we understood that the consequences of climate change will disproportionately affect young people, so we invited the school students to share their responses to the ideas and findings of researchers contained in the articles. We suggested that this was an opportunity for school students to speak to researchers about their views on science education and the climate crisis and that they could do this through discussions in the workshop or by adding their ideas in writing and asking their teacher to send these responses to us during or shortly after the event. We provided the opportunity for their contributions to be recognised by name, and these are listed at the end of this article. By framing the workshop as an opportunity for us to pose questions (for example 'What do you think?') and respond to those asked by the school students, we

sought to create an open and friendly space where we as researchers were there to learn from and with the school students. Throughout the workshop, we described the findings that we presented as ideas that were part of an ongoing conversation and discussion rather than as a set of rigid 'facts'. The key text shared and the associated discussion prompts are presented in Table 1. The responses were not all unanimous among members of the youth panel: we include the full range of ideas shared with us in the youth panel responses. These are taken directly from discussions and we leave the comments open for your own reflection.

Responses of the youth panel

No contribution is too small

There are contributions that individuals can make, like using much less plastic, recycling what plastic is used, using alternatives to plastic, raising awareness by giving presentations and speaking in public, or talking to people at home and your friends. There are also actions that people can take together – they can go on climate strikes and make people in power listen. In schools, we can learn more about the climate crisis in lessons and beyond lessons, for example in assemblies and through groups like the green leaders, or by taking part in citizen science projects to learn about the environment and how to use science and work together. Governments need to contribute because they have the power to make change.

'More' (and early) climate education

Climate change is a serious issue and young people have the right to know about it. The headlines we see in the

Table 1 Prompting responses to research on science education in the context of the climate crisis

Finding shared (with reference to the article is this special issue of SSR)	Discussion questions/prompts
Education IN, ABOUT and FOR the environment needs to be included in school inspections, exams and teachers' standards. (King <i>et al.</i> , 2021)	What do we mean by 'education in, about and for the environment'? Do you agree or disagree? What are your reasons?
The youth of the world have a significant contribution to make in the fight against climate change. We all have a part to play, and no contribution is too small. (Aston <i>et al.</i> , 2021)	How do you respond? What do you think? Which contributions are most important? Are some contributions more important than others?
Recent civil action has called for 'more!' climate change education but 'more' of what? (Greer and Glackin, 2021)	Thinking about climate change education, what do you want more of? What do you want to learn more about? How do you want to learn about it? Where do you want to learn about it?
Whilst there is a clear duty to believe that humans cause the climate to change, it is less clear what action we should take. (Brock and Glackin, 2021)	What should teachers do to take action on climate change? What should schools do?
'Knowing more' can help one 'do more' but, there are many barriers to activism that will not be addressed purely by increased climate change awareness. Experiential approaches are needed. (Safaya <i>et al.</i> , 2021)	What barriers do you see? What stops you taking action? How important are experiences and practical activities?
The ethical, legal and moral issues associated with climate change must be taught – starting from primary school. (Hendry, 2021)	Do you agree or disagree? What are your reasons? What age should children be when they learn about climate change?
Climate change education requires a STEAM (Science, Technology, Engineering, Arts and Mathematics) approach. (Rudd, 2021)	Do you have the arts (for example music, art, drama, dance) in your science lessons already? Do you need the arts in your science lessons? Can you explain why or why not? What changes would you like to see?

media can be scary, for example '*Adapt or die*'! Teachers can help us understand so we want more teaching in school about climate change.

We want to spend more time learning outside the classroom, we would like to have our lessons in any subject outside so that we spend less time in a classroom. We think Forest Schools sound awesome and we enjoy learning about biodiversity when we are active outside, for example through our school gardening club. We want more practical experience to help us understand climate change, including practical work. We really enjoy meeting experts and researchers from universities and industries as a way of learning more about climate change.

We need guidance on what we (individuals) can do to help so that it has a big impact when everyone does it. Like how to make more sustainable choices with clothes and makeup and how to reduce our carbon footprints. We also need to know about how to fight for our rights – like the climate strikes – but without missing our education.

We need to introduce this at an earlier age so that we can get into good habits earlier on in life and make better decisions later in life. Learning about climate change can be fun in primary school because the whole school could take part in activities to learn about climate

change. Primary school is the right age, if children are taught well, they will understand.

Experiential approaches are needed

We think that by taking action on climate change you are making a difference. We agree that knowing more is not enough. We need awareness and experience to know what is happening and what we should do. We need to know what to do and how to make changes, and that means learning from others as well as learning more information.

We enjoy working with scientists and researchers who work with climate change but sometimes we find writing reports challenging. We know that learning and writing is important but sometimes it is the experience that counts, as this is what you remember. Experience also brings passion to make the changes and to understand the importance of climate change.

The role of teachers and schools

We see schools as very important to our communities; they are at the heart of our towns. We want them to be places where everyone can learn about climate change and

learn how to take action. This needs to be in every subject, not only geography and science. We like learning about climate change and the environment through the Sustainable Development Goals in our school, and practical and hands-on activities to learn about climate change. Subjects like engineering could be made more environmental.

Teachers should be role models for us to follow. If they're helping, it will encourage students to help too. Teachers should also provide opportunities for people to take action and promote taking action. In schools, we should use far less plastic and paper and there should be support from the headteacher for zero plastic use.

If climate change and what we learn and what we do to protect the environment is something that is important to people in power, then they should use Ofsted, which has a lot of power, to influence schools and that will help all of us to take action.

Science is important but it is not enough

Art can be very influential. Some people don't engage with or connect with science and might be more likely to

listen and understand if the arts are involved. We think including arts in climate change education is better as it supports us to develop creativity and to visualise ideas, problems and solutions and to make presentation of ideas more interesting.

Conclusions

The youth panel sees schools as places to take practical action as well as learn about climate change in every subject. They see a place for experiential learning (e.g. practical hands-on work, outdoor learning, the arts, research and citizen science) from primary school age onwards. They want to make a positive impact on the environment now and in the future; and look to the adults in their lives and communities to match that ambition. The articles in this special issue suggest some ways that these actions can be taken forward by science educators.

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Youth panel:

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