

Sustainability education

Should it be an entitlement for all UK pupils? Is time running out for action on climate change?



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In his Editorial (page 3), Shaun Reason mentions the recently published IPCC report. References to other key international developments, such as the UN Sustainable Development Goals, can also be found in this issue and online in a special supplement.

What does effective 'Environmental' or 'Sustainability Education' look like? How does this link to best practice STEM education? There is some

consensus here amongst our authors. Justin Dillon's research piece argues for a curriculum where students see how the science that they study 'links with the arts and humanities, with place, space and identity', with a focus on 'values as well as facts'. Melissa Glackin also argues for a broader approach and states that there is too great 'an imbalance towards debating whether anthropogenic climate change

exists, rather than a focus on the complicated (scientific) mechanisms involved and the current, and possible future, mitigation approaches required'. Ann Finlayson describes in her online article the need for a whole school systems-based approach to the topic. Both Finlayson and Glackin point to how, before the recent curriculum reforms in England, such an approach did exist. Both call for its return.

'But don't they teach that in geography?'

The state of environmental education in secondary schools in England

Before 2014, environmental education was one of four core pillars underpinning the National Curriculum in England. However, following curriculum reforms, environmental education lost this status: the pillar was axed. Furthermore, whilst changes to assessments and practical work are widely reported and debated, there has been limited noise around the demotion of environmental education in national school policy.

At King's College London, we have been exploring the current state of environmental education across secondary schools in England. Funded by the British Academy, one aspect of our work involves the analysis of geography and science curricula, school departments' schemes of work, and associated resources. Our findings reveal four key concerns relating to environmental education provision.

First, whilst environment-related content is incorporated across Key Stage 3 (KS3; ages 11-13) and Key Stage 4 (KS4; ages 14-16) geography and science curricula, it is more evident

within geography than science. The implication here is that students will have limited exposure to the discipline: geography is only mandatory at KS3, and moreover the subject usually only receives 1-2 hours of curriculum time per week (compared to 3-4 hours for science). This lack of exposure has been further exacerbated following the removal of the national KS3 assessments – which historically took place at the end of Year 9 (ages 13/14) – as many schools (including several in our sample) have compressed the KS3 curriculum from three years into two so that GCSE preparation commences at the start of Year 9. Whilst this would not be an issue were geography a mandatory GCSE subject like science, however, geography is optional. Currently, around 50% of students in England study GCSE geography – leaving half the population with a very reduced environmental education after Year 8.

Second, there is duplication of content across geography and science curricula. This includes: ecosystems;

feeding relationships; waste and recycling; and the water cycle. Whilst in general the subjects deal with the content through different approaches – for geography the emphasis is 'place-based' and for science on scientific theories and concepts – explicit connections between the two curricula are not evident in any document.

Third, given that climate change is arguably the biggest issue facing the planet, it is somewhat surprising how little curriculum time this topic receives across either geography or science schemes of work and specifications. The limited time is further compromised by the narrow focus on evidence for climate change. Whilst important to understand data and scientific reporting, there is arguably a dominance, and an imbalance, towards



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To clarify, our Scottish article is written by LfS Scotland (LfSS), a UN network that includes Scottish government agencies. It provides support for Scottish schools, colleges and universities on these issues. LfS is the term commonly in use for Sustainability Education across Scotland's National Curriculum documents. It is interesting to see how Learning for Sustainability (LfS) in Scotland has developed over the last few years.

On page 10, Cerian Angharad describes the ongoing work, including much on environmental sustainability, happening in the Welsh schools review.

We include too a joyful exploration of Kulvinder Johal's pupils' quest to find out about 'life on water', exemplified by this quote from an 8 year-old: 'The best part of the whole trip was learning about the heat exchanger and how it heats the boat.' We are pleased to include a short piece from the Earthwatch Institute on the 'naturehood' of schools and how important citizen science is in today's educational world.

It may not be possible to change the current National Curriculum in England in the short term; however, there is much that can be done within the current system. Urban Science, a pan-

European urban science project, seeks to improve the teaching of inquiry-based learning so that pupils develop the competences to actively contribute to creating healthy cities, gain scientific skills, and envision sustainable cities for their future. We are looking for secondary school partners, so do get in touch if you are interested in being involved in our trials.

We hope that the articles here and in the online supplement will offer some positive ideas about making a difference with your students.



urban science
urbanscience.eu/uk

debating whether anthropogenic climate change exists, rather than a focus on the complicated (scientific) mechanisms involved and the current, and possible future, mitigation approaches required.

Finally, the geography and science curricula offer students very few opportunities for active participation in environmental improvement. The majority of amelioration approaches concentrate on technological advances, with some, but limited, discussion of the role of legislation and only minimal exposure to any forms of social activism or discussion around alternative ways of living.

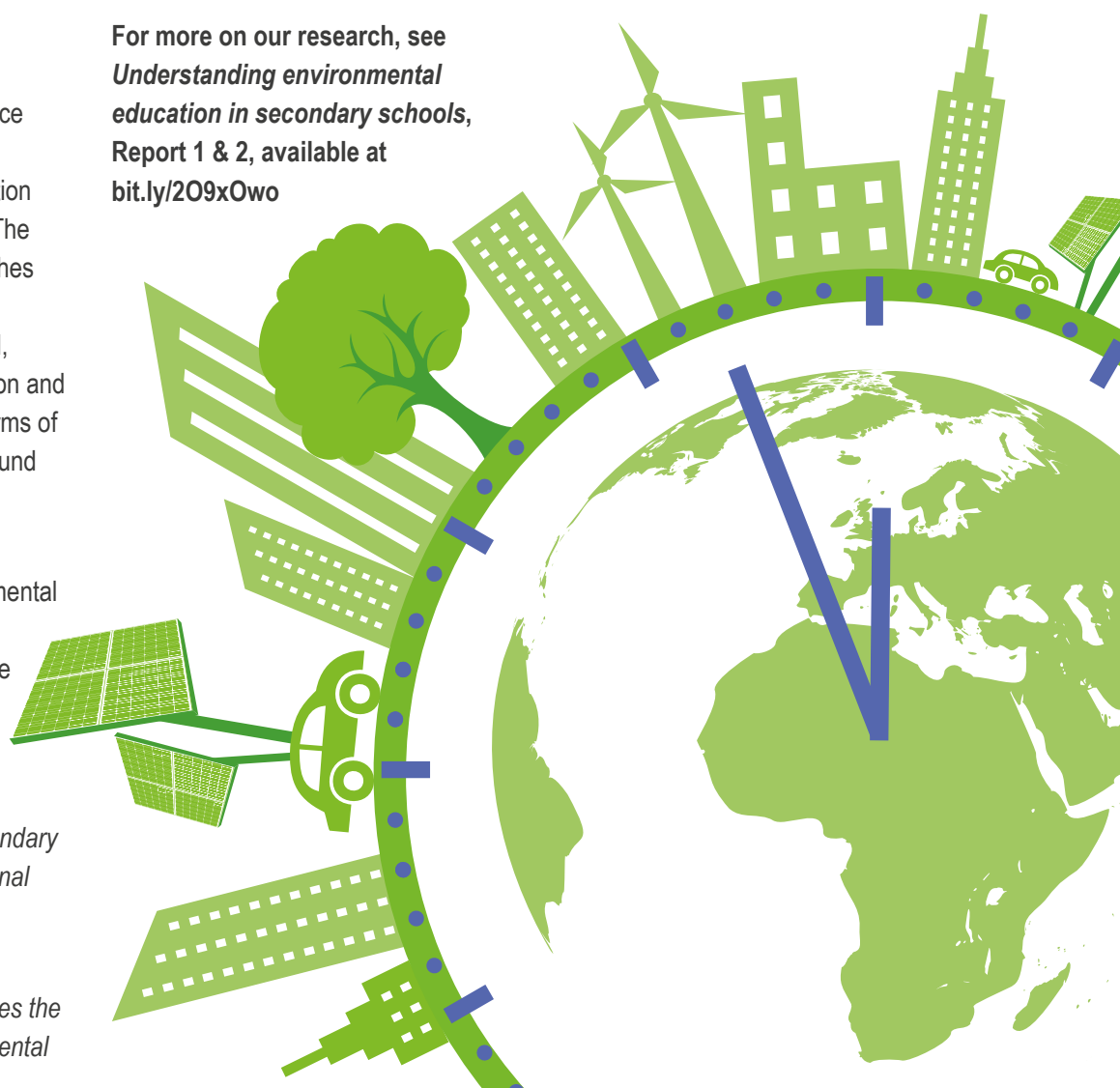
The National Curriculum greatly influences the shape of environmental education offered by secondary schools. Following our review, we call for:

1. A coherent national policy, which sets out a vision for environmental education in secondary schools that shapes future National Curriculum reforms and national assessments; and
2. A national policy that recognises the multiple dimensions of environmental

education (e.g. about, in and for the environment) and ensures that all dimensions are given equal footing throughout a student's school career.

For more on our research, see *Understanding environmental education in secondary schools*, Report 1 & 2, available at bit.ly/2O9xOwo

More articles online at
www.ase.org.uk/esd



Towards a convergence of science and environmental education to address wicked problems

When I started teaching in the 1980s, the environmental challenges facing the planet weren't simple to deal with, like an oil spill might be – the 'hole in the ozone layer', a much more sophisticated problem, dominated the headlines. Complex though it was, due to the concerted efforts of scientists, politicians, environmentalists, journalists, manufacturers and others, the problem seems to have been resolved. The hole is likely to return to its pre-1980s appearance within 60 years. Facing us now is a series of problems that are very different – climate change, poverty, food security, biodiversity loss, etc. These problems have no solution and require society to adapt to them to minimise their impacts. They have been termed 'wicked problems' and require interdisciplinary responses and adaptive leadership.

Wicked problems have implications for teachers as well as for curriculum design at school level or beyond. Traditional 'problem-solving' approaches don't work with these new challenges. What is required is a much more radical approach focusing on what Arjen Wals (see note below) describes as 'sustainabilities'. These include systems thinking, appreciating chaos and complexity, connecting with people, places and other species,

empowerment and collective change. These are not the 'learning outcomes' that our traditional school system delivers.

I would argue that our existing system tends to provide students with many basic ideas about the world, but does not encourage people to see the big picture. And our overly specialised university system often misses opportunities to join up people's thinking. There are some marvellous interdisciplinary initiatives emerging in UK universities, but this might not be mirrored in the majority of schools.

So what might work? In a paper in *Science* in 2014, a greater convergence between science and environmental education was argued for (Wals *et al*, 2014). Science education occupies a place at the curriculum high table – virtually all students have to study it – whereas environmental education feeds off the scraps, struggling to find a niche in many schools. However, environmental education provides that bigger picture: how the science they study links with the Arts and humanities, with place, space and identity. Environmental education focuses on values as well as facts. And there has surely never been a time when the curriculum needs to focus more on values.

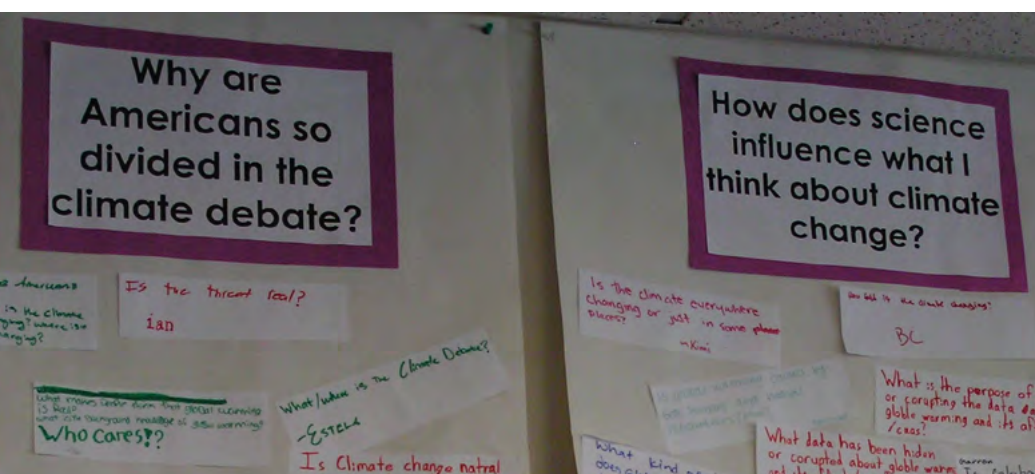
What would convergence look like? In the *Science* paper, we provide one example – so-called 'edible gardens', which are becoming increasingly common in primary schools. Through such initiatives we argue that: *'schools can, with the involvement of a wide range of societal factors (e.g. a local garden centre, a restaurant, a community organisation, and the local government), simultaneously improve the quality and relevance of their education and transform their relationship with the local community'* (ibid, p.584). While science education supports such initiatives because *'soil preparation, seed selection, planting, maintaining, harvesting and preparing a meal require basic scientific knowledge'*, environmental education encourages other benefits *'such as community engagement, learner empowerment, improved personal health, and a better connection with food and place'*.

We might recognise that the UK is now in a very different place than in the 1960s. There are many threats facing society – social, environmental and political. Simply tinkering with the existing education system isn't good enough – it's just not working.

Reference

Wals, A.E.J., Brody, M., Dillon, J. & Stevenson, R.B. (2014) 'Convergence between science and environmental education', *Science*, (344), 583–584

For details about Arjen Wals' ideas visit: transformativelearning.nl/about



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The 'Naturehood' of schools

Nature provides us with the biggest canvas on which to study science. National Parks, nature reserves, school grounds, parks and gardens all support a rich tapestry of life, where we can study the natural world based on facts learned through experiments and observation.

Nature is everywhere around us and, with a little nurturing, many species can thrive in the most unlikely places. However, space for nature is disappearing at alarming rates, which has already caused more than half of all UK species to decline. How do we stop the decline and do our children care enough to act? As Sir David Attenborough concluded: *'No one will protect what they don't care about; and no one will care about what they have never experienced'*.

The decline in many common species has been paralleled by a declining connection between people and wildlife. Many children no longer spend long afternoons climbing trees or roaming the local woodlands; many adults rarely notice the wildlife on their doorstep. This disconnect between people and nature is all the more worrying given the massive benefits nature provides, ranging from pollination to flood risk reduction and health and wellbeing benefits.

Earthwatch has embraced this challenge, to connect and motivate the next generation through our 'Discover Earth' Programme. We inspire young people and educators to take positive action to protect the natural world and ensure a sustainable future for all. Our programmes take learning outside, involve hands-on science activities, resources and inspiration. Workshops give teachers confidence in engaging their students in national and global research projects and, through using the Global Goals for Sustainable

Development, empower the students to feel that all their actions, however small, can have a positive impact on our planet.

So where is the nature to which we can connect students? Gardens, school grounds and communal green spaces may be part of the solution, providing excellent opportunities for alternative areas for nature alongside their human use. If we could turn all UK gardens into nature-friendly places, we would create a 'nature reserve' of over 430,000 hectares – more than four times the surface area of all national nature reserves combined.



The value of gardens, school grounds and urban green spaces for nature has been demonstrated repeatedly but, for many, this potential is not being utilised, with hard surfaces and monoculture lawns and fields dominant around us.

Although it is easy to guess how wildlife could be encouraged into gardens or school grounds, actual evidence on the effectiveness of actions such as sowing wildflowers or putting up nest boxes is surprisingly limited. We know very little about what scale and circumstances are required to have the biggest impact on a range of species. There is a need to investigate this, to encourage those actions with the biggest positive impact



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experiences that transform both hearts and minds.

This is where Earthwatch comes in – central to our approach is the use of citizen science, whereby anyone can gather robust data to generate environmental insights and inform future policy. Citizen science gives scientists a greater understanding of how we're impacting our planet and allows for better decisions on the management of our natural resources, connecting people in a global environmental movement.

Schools are key partners in taking action and monitoring results within Naturehood. With an online portal allowing us to map, track and monitor wildlife and the impact that our wildlife-friendly interventions are having, schools and communities are able to see how wildlife is improving in their local areas, use data collected to inspire their own scientific questions and develop science literacy. Benefits to wildlife, increased connection to nature and improved agency to act to protect the planet make citizen science projects a valuable tool for schools seeking to embrace education for sustainable development. **For more details, visit www.Earthwatch.org.uk**

Learning for Sustainability – Scotland

Thinking globally, acting locally

Sustainability is central to Scotland's national vision. It's at the heart of the Scottish Government's National Performance Framework¹ and, in Scotland's educational settings, 'Learning for Sustainability (LfS)' is not only an 'entitlement' for all learners², but part of the Professional Standards³ for all teachers and the national framework for whole-setting evaluation – and inspection⁴.

'Our vision is of a flourishing Scotland where sustainable and socially-just practices are the norm.... and our roles and responsibilities within a globally-interdependent world are recognised... learners are educated through their landscape and understand their environment, culture and heritage; and develop a sense of place and belonging to their local, national and global community, with a deep connection to the natural world.' - **The Report of the One Planet Schools Working Group (November 2012)**

This has not happened overnight. It is the culmination of many years of policy and practice enabled by a powerful combination of innovative, cross-sector activity. Much is due to a growing recognition that knowledge and skills alone are no longer enough in an interconnected world facing unprecedented challenges. A third element, that of 'values and attitudes', is essential if learners are to become 'life-ready' individuals: aware, resilient, informed and empowered to think critically, empathise, contribute and succeed at a personal and local level, and on a national and international stage.

What is 'Learning for Sustainability (LfS)?

LfS is an approach to learning, life and work. It is not a 'subject', but an ethos that permeates all aspects of learning: enabling and empowering learners, educators, settings and communities to build a socially just, sustainable and equitable society. LfS weaves

together many themes, including global citizenship, sustainable development education, outdoor learning and social justice, to create coherent, rewarding, meaningful, relevant and transformative learning experiences.

Moving from abstraction to application

Much has facilitated this journey, but three key themes have contributed to its current success:

1. Consistent, coherent support at policy level

- Five strategic aims underpin Vision 2030+⁵; which sets out Scotland's vision for LfS through to 2030: All learners should have an entitlement to LfS; Every practitioner, school and education leader should demonstrate LfS in their practice; Every setting should have a whole-setting approach to LfS that is robust, demonstrable, evaluated and supported by leadership at all levels; All school buildings, grounds and policies should support LfS; A strategic national approach to supporting LfS should be established.
- The creation of Scotland's United Nations Regional Centre of Expertise in Education for Sustainable Development⁶

2. Frameworks that empower meaningful, tangible activity.

- Our Curriculum for Excellence⁷; underpinned by the core values of wisdom, justice, compassion and integrity; weaving LfS across all subject areas through its Experiences and Outcomes
- Support for initiatives such as the John Muir Award, Eco-Schools, and Rights Respecting Schools

3. Support to build practitioner confidence and capacity.

- Local authority and 'cluster'-based learning opportunities
- Strong networks of NGOs and community organisations; often supported with public money

Alignment and action

Vision 2030+ outlines LfS as a context for addressing key national priorities, including raising attainment, closing the attainment gap and helping to develop Scotland's young workforce. This aligns perfectly with Scotland's new STEM Education and Training Strategy⁸; with its vision of a population equipped with the STEM and digital skills, knowledge and capability required to adapt and thrive in the fast-paced, changing world and economy around us.

This offers opportunities to embed truly innovative, engaging approaches to science, with the flexibility of the curriculum allowing educators to deliver learning in a way most appropriate to their learners. Topical science is one of eight 'organisers' within our curriculum's 3-15 year phase, and this gives scope to investigate controversial, ethical scientific issues of relevance and interest to learners. Support for outdoor learning means educators can readily investigate topics in contexts and communities that make learning more relevant and meaningful for all.

This is our aspiration for science and sustainability – young people with a fascination and curiosity about science, an understanding of and connection to our place in the natural world, and a personal commitment to live sustainably to protect it for future generations to enjoy.

References

1. Revised in June 2018 and available here: <http://nationalperformance.gov.scot/>
2. <https://education.gov.scot/improvement/Documents/res1-vision-2030.pdf>
3. <http://www.gtcs.org.uk/professional-standards/learning-for-sustainability.aspx>
4. <https://education.gov.scot/improvement/self-evaluation/HGIOS4>
5. <https://education.gov.scot/improvement/Documents/res1-vision-2030.pdf>
6. <http://learningforsustainabilityscotland.org/>
7. <http://bit.ly/2SIIUOq>
8. <http://bit.ly/2CCuiE1>

Education Scotland is an Executive Agency of the Scottish Government and is responsible for quality and improvement in Scottish education.

Life on the water

How do you live sustainably on a boat full-time?

So many people are doing it, whether it be for a holiday or a life-changing move onto the waters. Our eco-warriors from Northbury Primary School travelled down to Hermitage Quay at Tower Hill, London to find out how sustainable life is on a boat.

As we walked down to the classroom, which floats on a pontoon on the Thames, the children gasped with excitement – they are from an inner city school, where the only water they really see comes out of a tap. The first things that the pupils noticed were two small bicycles and a scooter tied up by a boat: *'Wow – even children live on a boat! It's not just "old people"'*.

The pupils of Northbury Primary were the guests of the Thames Riverboat team. The purpose of the visit was to look at energy usage and sustainability. Pupils learned about the different types of fossil fuels, how they are made and extracted. The pupils then looked at how clean the river water was and whether it was suitable to use on a boat. Pupils tested the water for nitrates

and phosphate and also learned a new term, 'turbidity'. They measured the turbidity of the water, how far they could see into the water and found, unsurprisingly, that it was not that deep.

The mixed group, aged 6-11 years, were keen to look at the boats and work out where they got their energy from. Armed with clipboards, the students noticed that people who live on the water use both wind and solar energy to dry their clothes. They spotted the solar panels quite quickly, but other features were hard to see. River residents also use energy-efficient light bulbs and have spent a considerable amount of money to double-glaze their windows to conserve heat. Pupils saw logs stowed away, ready for creating heat for cooking and keeping warm.

Pupils were asked to design their own energy-efficient boats and many chose solar panels, etc., as they realised how eco-friendly and cheap they were in the long run. They noticed various labels that were really useful and could be

replicated at school to see how energy- and eco-friendly the school was, and possibly their homes too.

Many boats on the water have been modernised to ensure that they are sustainable. One of the boats moored up on the quayside collects water from the river, which is heated by a heat exchanger and helps to run the underfloor heating on the boat. It was fascinating and very high tech! Ismael, aged 8, said *'The best part of the whole trip was learning about the heat exchanger and how it heats the boat.'*

Each boat had a bicycle tied next to it, most were growing their own produce and each boat had some bottled gas on standby. So, people can lead a sustainable, outwardly relatively simple life, although these lifestyles have been very well thought out in a caring, considerate and communal way.

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NOVEMBER

17/11/2018 [Conference](#)

ASE Northern Conference 2018

Sheffield Institute of Education, S1 2NH

17/11/2018 [Conference](#)

ASE West of England Conference 2018, Bath Spa University, BA2 9BN

23/11/2018 [Conference](#)

STEM Learning/ASE Primary Conference, Postal Museum, London, WC1X 0DA

24/11/2018 [Workshop](#)

Build It – Creative Stem Projects, Sandfield Primary School, LE4 7RE

29/11/2018 [TeachMeet](#)

ASE(NI) Post-Primary Teachmeet, St Dominic's Grammar School, Belfast, BT12 6AE

DECEMBER

03/12/2018 [TeachMeet](#)

ASE Primary TeachMeet

Northampton, Irchester Community Primary School, NN29 7AZ

06/12/2018 [Workshop](#)

ASE Workshop: It's a Christmas Cracker, Coedcae School, SA15 1LJ

12/12/2018 [TeachMeet](#)

ASE Cross Phase CPD, Institute of Education, Warwick Uni., CV4 8EE



17/11 Bath Spa

COMING UP

09/01/2019 to 12/01/2019 [Conference](#)

ASE Annual Conference 2019

University of Birmingham, B15 2TU

09/03/2019 [Conference](#)

ASE Scotland 2019, Hutchesons' Grammar, Glasgow, G41 4NW

19/06/2019 [Conference](#)

ASE South East 2019, University of Surrey, Guildford, GU2 7XH

21/06/2019 [Conference](#)

ASE(NI) 2019 - Futureproofing Science Education

St Mary's University College, Belfast, BT12 6FE

04/07/2019 to 05/07/2019 [Conference](#)

ASE Futures Conference 2019

Sheffield Hallam University, S1 1WB