

Reflections on the ASE Conference: A collective perspective from the ASE International Committee ■
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Members of the Committee share how sessions during the ASE International Day of the 2021 ASE Annual Conference provided some thought-provoking and inspirational experiences.

The ASE Annual Conference 2021 invigorated the science education community to come together, exchange ideas and compare pedagogical insights and approaches. The repercussions of the pandemic: emotional, social, medical, economic and educational, remain present and this virtual International Conference gave science educators across the globe an opportunity to pause and take stock. Over the duration of the four-day event, from Wednesday 6th to Saturday 9th January, educators and researchers across the sector came together and, in doing so, raised the profile of science education. The spirit of the ASE Annual Conference, something many of us have embraced, prevailed and the following reflections on sessions from the International Committee reflect this. Many presentations at the Conference this year enabled all educators to look beyond the confines of their particular science curriculum and consider how other countries structure and approach science teaching. Marc Neesam, Judith Roberts and Daniel Morrish from the Cambridge Assessment International Education team compared competency-based national curriculum frameworks in Ghana, Kenya, Kuwait, Estonia and Australia. They talked about why health education is a valid, and vital, part of the science curriculum in many countries and what were the underlying principles of what to include in the biology curriculum, with a summary of placement of health-related content for these five countries.

Chris Preston, Senior Lecturer at the University of Sydney presented a case study exploring teaching electricity in Year 6, adopting a Representation Construction Approach. Insights into students developing understanding of the science concepts were encapsulated by interviews, video and learning journals. She explained the effect of using a diagram to develop primary students' conceptual understanding about electric circuits. Findings indicated that use of diagrams positively improved understanding. An important finding was that students' conceptual models of electric circuits were energy- rather than current-based, which has consequences for teaching electricity at the primary level.

The main focus of David Shakespeare's presentation was 'Learning from others: how can you compare one science curriculum with another?' Science is a complex subject and science curricula around the world are diverse. Some interesting questions were posed to the delegates, asking them to state the features they expected to see in a national/state curriculum. This sparked interesting responses and debate, which left delegates pondering on areas that they deemed necessary as driving factors in promoting the curriculum. A key question arose around whether no one curricular approach might serve the needs of students. As educators, we may need to consider various models of curricular design as means to support teaching and learning and allow all learners to access the curriculum. Therefore, the lesson that needs to be learned from this presentation is how various subjects can be combined to develop a curriculum that will promote scientific learning as part of citizenship, and sustainability.

Dan Lyng explored, within his International School context, how we can get children to talk scientifically and ultimately 'Bring science to life'. Drawing from recent research and key reports (e.g. the 2017 report from Gatsby), Lyng emphasised that achieving this relies on professional development and developing communities of practice. International schools have always had to

consider how to establish professional communities remotely and Dan highlighted how social media (Twitter) and online learning platforms (Google Classrooms), now integrated within practice across so many schools, are a perfect vehicle for this. In essence, if we continue to seek to learn, share, adapt and improve, then we are modelling lifelong learning.

Minoru Itoh from the Tokyo University of Science is a regular presenter at our international conference and it was a joy for Margaret to take part in his workshop. Firstly, he set his curricula context: Japan is currently undergoing changes in its national curriculum that require a focus on the 'exploration of science'. Specifically, students are asked to explore maths and science problems by thinking about their own real-world context, and then to formulate a method for solving the problems. Minoru's talk was themed around the ideas of the 'exponential function', with many examples drawn from the phenomena of nature. He explored how to release students' creative ideas by using many fascinating still and moving images. These ranged from the logarithmic spiral of mollusc shells, to how Antoni Gaudi introduced geometrical properties into his designs and, of course, ending with COVID-19 and how exponential growth has enabled its spread across the globe. Our truly international audience had the opportunity for a full discussion regarding the importance of linking the geometry of mathematics to natural phenomena. We discussed how our students could use these ideas to explain and solve our real-world issues. Minoru sparked much debate and interest amongst the delegates: there was much to take away and use within our own contexts.

In 2021, the 'real-life' contexts and opportunities that enable us to promote scientific literacy, and indeed the key skills and attributes that define what it means to think and behave scientifically, were at the forefront of many discussions. Alex Black explored 'Explaining as a key competence: using data and complex ideas' within the 'real-life' context of push-pull farming in Africa. Push-pull farming allows for an understanding of sustainability in terms of promoting a balance between nutrient depletion in the soil by plants and other agents. Striga and stem borers are considered to be the most dangerous pests attacking maize plants, but the push-pull system of farming has been useful in ameliorating the situation. Also, push-pull farming is independent of genetically modified plants and pesticides, making it a way forward to support better food/crop plant production in Africa and promoting sustainability. Ade, a member of the Committee, reflected on how this presentation shows the importance of promoting agriculture as a subject in the national curriculum as it is practised in some countries. Ade also wondered if including agricultural contexts within the science curriculum in England could be a way to promote and support vocational education and the later career opportunities available through this.

Tonia Williams and Miles Hudson explained how resources from the Perimeter Institute could help students to foster excitement for learning about developments in Black Holes, (exploring the basic physics behind them, the latest observational evidence for them, and some of their more exotic features, such as time slowing down); gravitational waves and Event Horizon Telescopes, and introduced some classroom resources that participants could take back with them to bring this remarkable topic into their classrooms.

Amy Strachan and Jemima Davey at St Mary's, Twickenham shared their recently created framework for learning and teaching science, which is underpinned by the UN Sustainable Development Goals (SDGs). They have been commissioned by Millgate House publishers to write a book that contains resources to help primary colleagues use the SDGs to drive their planning for learning. This they believe will develop the global science learner. They shared some innovative science enquiries, each informed by particular SDG goals and designed to empower children to recognise themselves as agents of change in science education. They challenged the virtual audience to identify some attributes that are associated with being a global citizen. They then encouraged the audience to consider how some of these attributes, such as being a communicator, being interdependent, having

passion and respect for global issues (e.g. global warming, sustainability, renewable energy sources) are equally paramount for scientists today. The enquiry questions shared ('Should we eat insects?', 'What would life be like without oceans?') encourage children to think critically and maintain an open mind. Competencies such as 'thinking critically and maintaining an open mind' are essential for science and, as experience is showing us, essential for life.

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