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■ Debra McGregor ■ Leonard Newton ■ Fiona Woodhouse

There was something for everyone related to research at the ASE Annual Conference this year, whether a primary or secondary school science teacher, trainee, teacher educator, researcher or teaching assistant.

Over forty sessions provided the opportunity to listen to, consider and discuss the processes or outcomes of educational research related to science teaching and learning.

There were presentations and seminars that provided the chance to talk to funders of research, those in the process of researching and those more experienced who had stories and outcomes to share with others. The audience that could benefit from these presentations ranged from the qualified teacher wishing to know more about pedagogical strategies to improve learning in the classroom, to policymakers looking for evidence that might suggest how schools and classrooms might be more effectively managed and organised, to beginning teachers linking theory to practice.

Particular highlights

The range of presentations on offer included a variety of different foci and findings. Two International Day talks promised quite an insight into alternate learning situations to ours here in England. A talk entitled 'Square Pegs' by the new Chair-elect of the National Science Teachers Association, Juliana Texley, was intended to offer an American perspective of the various strategies that have been used to motivate and excite learners in a variety of schools across the Atlantic. An Australian educator, Greg Smith, promised an 'indigenous perspective' that explored tensions between long

held western views of science and those that emanated from folks who lived in the 'bush'. These two presentations, although we did not hear them, are the kind that we would like to see more of next year, to find out more about the ways in which international science education is developing.

'There is an underpinning philosophy that the research process should have more attention paid to it, in order to check the integrity and verifiability of the research claims'

Within a UK (and more English focused) context, the organisation ResearchED presented some astute and shrewd accounts of research-related activities. Alom Shaha talked about some of his research-in-progress. He made an interesting observation that, when he had written and blogged about atheism in schools, he had little or no response to his ideas, but as soon as he shared a view of practical work being a waste of time (drawing on a particular body of science education research work), he found there was an impassioned view from most ardent supporters of practical work in science classrooms! He was taken aback by the staunch (verbal) attack defending what many science teachers value incredibly highly. Tom Bennett, a Teacher Fellow of Corpus Christi College, Cambridge University, talked about the development of ResearchED, an organisation promoting research literacy in education. ResearchED's various aims include promoting 'working out what works', as well as increasing the criticality with which parties who use educational research (teachers, academics, researchers, policy makers and teacher

trainers) engage, and challenge findings to consider more carefully what data collected might mean. There is an underpinning philosophy that the research process should have more attention paid to it, in order to check the integrity and verifiability of the research claims. With this in mind, Tom described the burgeoning interest in this area and promoted the website that currently offers a discussion about randomised controlled trials (RCTs), written by Stephen Gorard (2014).

In another research session, a presentation by a visitor from 'down under' (Wang Ng) offered a rich description of a national project currently being funded by the Australian Government to find out what students think about science! She obviously had collected much data and was in the process of scrutinising the views of 1344 14-16 year-olds before and after engaging in four inquiry-focused online modules themed around 'Are we alone?'; 'Earth'; 'Superbug challenge' and 'Nano design'. She described how they had taken a mixed methods approach, which included applying statistical analysis to ascertain the extent of impact of the interventional materials.

The assessment of practical work in science education has recently been the subject of animated debate at various levels within the science education community. The discussion at ASE was equally lively. Professor Michael Reiss, from University College London Institute of Education, chaired a very well-attended discussion on the assessment of practical work. The debate was hosted by the National Science Learning Network, the Royal Society and the Wellcome Trust. The session began with four short presentations on issues that sought to pose questions for all to consider and debate. Two of the inputs came from colleagues teaching in the early years and secondary phases and these were

complemented by two contributions reflecting the school leadership perspective and that of an awarding body. The group discussions and plenary raised a wide range of concerns. Unsurprisingly, there was broad consensus on the central importance of practical work to students' experience of learning science in all phases of education, but there was acknowledgement too of the need for teachers to argue the case for practical work to school leadership teams in order to secure curriculum time and resources to support it.

'The point was made that the consensus that seems to be emerging around the prospect of a Royal College of Teaching might provide the opportunity to establish a high-trust system in which practical work and its assessment might flourish'

The cost implications of practical work in terms of curriculum time and the value attached to it by the assessment system were also debated. Two themes emerged that appeared to be critical to the future of school practical work. Firstly, the responsibility that, as science educators, we have to advocate for it and to value it ourselves and persuade others to do the same. Secondly, the need for greater professional trust of science teachers as being best placed to assess their students' practical skills and 'know-how'. The point was made that the consensus that seems to be emerging around the prospect of a Royal College of Teaching might provide the opportunity to establish a high-trust system in which practical work and its assessment might flourish.

The primary science programme began with the Brenda Keogh Lecture 2015, given by Paul McCrory. This was a very lively (and, yes, entertaining) start to the Primary Conference. The focus of the lecture concerned engaging students' interest and Paul argued that capturing and keeping student attention was the most important job of teachers. Although the lecture itself was very practical, Paul was clear about the research base that underpinned the ideas and techniques he advocated. One link between emotional engagement, cognition and reason was admirably demonstrated through the use

of awe, wonder, surprise, humour and anticipation, not least on the part of the audience participants! The Wellcome Trust offered a session explaining the six significant studies related to neuroscience that they were funding, including projects on Teensleep; Learning counterintuitive concepts; Fit to study; Spaced learning; Engaging the brain's reward system; and GraphoGame Rime. Each of these may become relevant to science education in differing ways, some more directly than others. The Learning counterintuitive concepts, for example, aim to test the benefit of training pupils to suspend their pre-existing beliefs when solving mathematical or scientific questions; for example, correcting the seemingly logical notion that a heavy object will fall faster than a light one.

The Research Specialist Group (RSG) contribution to the ASE Conference

This year there were a series of sessions. The first one involved guiding participants to design an action research project, what pitfalls to look out for and what to consider when planning ahead. The second provided much detail about the ethical considerations teacher-researchers should bear in mind when carrying out their action research projects. The third session was designed to help participants to consider what (research) data they could creatively collect in the course of teaching and learning. These sessions will inform upcoming research focus articles (over the next year) in *Education in Science*. Finally, there was a poster session. This was the first time that this kind of session had been organised. Grateful thanks are extended to John Oversby, who contributed three posters to this part of the Conference: one looking at *Taking Chemistry Outside*; another, *Translating chemical education research into effective pedagogy: the explanation of dissolving* and, finally, one with a colleague from Reading on the crucial theme of reflection, *What is Reflection in an online PGCE Course?* Len Newton presented a collaborative poster with Michael Pitcher on *Analysis of Performance Understanding: From Messing about to Culminating Performance in Limiting Reactant IB Chemistry*. This showed how different ways of presenting understanding about chemistry can support 'apprentice' to 'mastery' of the subject. Two research students, Sarah

Frodsham and Tracey Martin-Millward from Oxford Brookes University, presented on ways of thinking about creativity in teachers' practice within a primary science context, and (missed potential) opportunities for learning in Forest Schools, respectively. Deb McGregor offered a way of (re)considering the nature of inquiry in primary practical science. Professor Shirley Simon provided a plenary on the posters that summarised their essence and possibilities about 'next steps' with the various research projects. This sharing of research format was well received by other teachers and researchers, who listened and asked questions after each poster was considered. The RSG thought that it fitted in well with the 'Research in Practice' theme of the whole Conference and will be further developed for the Conference next year. Requests for posters will be out in March – perhaps you could consider presenting? We encourage posters from all ASE members. This will be a chance to share what you are doing in a supportive environment.

Conclusion

This year's Annual Conference saw a marked prominence of research-informed sessions at Reading, and this was welcomed by the RSG. If you are reading this article, have an interest in research and have something to share with other practitioners, please let the Research Specialist Group know on dmcgregor@brookes.ac.uk.

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