Education in Science

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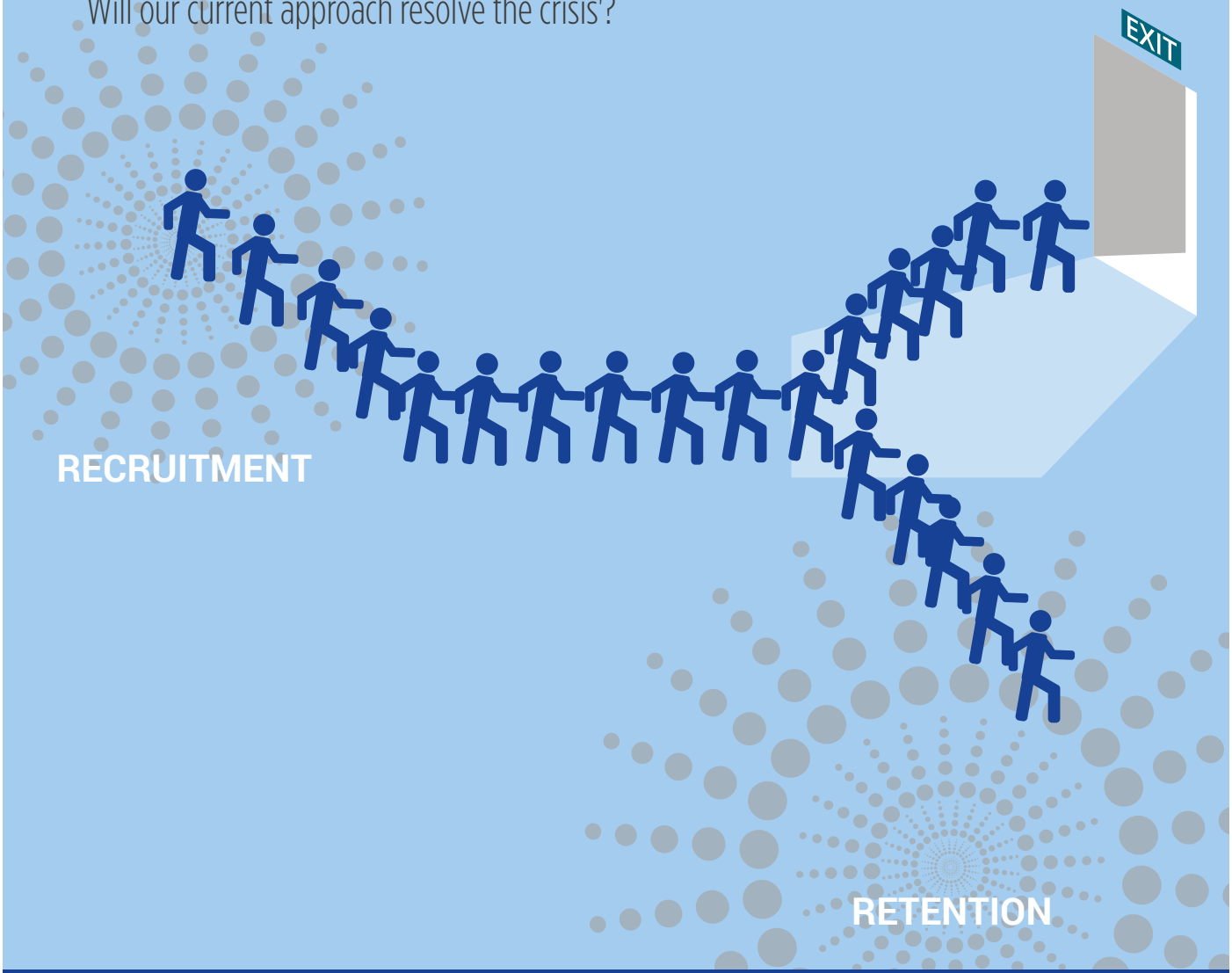
Science Teacher & Technician Retention and Recruitment

Will our current approach resolve the crisis'?



The Association for Science Education
Promoting Excellence in Science Teaching and Learning

Editorial

Welcome to February *EiS*.

Shaun Reason
Chief Executive
Twitter: @ShaunReason

In this issue, our main feature is on teacher recruitment and retention. The issue is affecting most of the UK, especially in science and maths. In January, the Department for Education in England (DfE) produced its *Teacher Recruitment and Retention Strategy*. The report is general and understandably does not deal in depth with the full context of science teachers. Reading it prompted me to write an article about the need to identify the specific factors, particularly technician support, that affect science teachers compared to teachers in general (see page 8). My article is written to promote further discussion and contains my own personal views.

There are further articles on this feature, including an update on ASE's Science Teacher SOS campaign, which was successfully launched last year to offer impartial, non-judgemental advice to teachers thinking of leaving the profession. The DfE is interested in seeing how they can work with us on this.

We also feature some highlights from our 2019 Annual Conference held at the University of Birmingham in early January. We are proud to host Europe's largest science education conference. This year there were 473 speakers delivering 504 sessions. There was an increase, compared with our two previous annual conferences, in our delegate numbers and the total number of delegate days. My thanks go to the conference team of volunteers, staff and stewards for their support before and during an outstanding four days.

We are delighted that Professor Sir John Holman became the new ASE President in January. ASE has been fortunate to have had some very distinguished people from educational research, from industry and from science, in the position of President. What makes John's presidency extremely special, on top of his record of outstanding contributions to science teaching and learning, is the fact that he has been an ASE member for over 40 years and a key contributor to many ASE projects. John's Presidential Address, *Why science teachers matter – their role in underpinning an innovative economy and improving social equity was warmly received in Birmingham* (see page 7).

This is the third edition of our new format of *EiS*, and our second new A4 format of *SSR* was recently circulated to relevant members. We are interested to receive feedback on these new formats. An online journals survey will be launched from mid-February – for those who prefer a paper version, you will find one printed on pages 33-34 of this issue.

Finally, I would like to wish you all a successful 2019!

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#ASEchat: getting science capital ideas into the classroom

In September 2018, we discussed what a science capital approach might look like in the classroom. First though, we needed to answer a few questions:

What is science capital? The concept of science capital is a way of encapsulating all the science-related knowledge, attitudes, experiences and social contacts an individual may have.

What is a science capital approach? (See bit.ly/ioescap) There was a lively discussion in answer to these questions. Some felt it was better called a 'lens' rather than an 'approach'. It's a way of thinking – a mindset – rather than a list of things to do. Science capital is a 'lens' through which we can think about factors that lead pupils to make decisions regarding A-levels, degrees, careers, as well as continued engagement outside the classroom and school, developing an interest, a passion for science that leads to intrinsic motivation to learn more.

Some wondered whether science capital was a new term for an old idea, i.e. relevance and contextualisation. However, others felt that it was very much more than that: *'… a personalised contextualisation approach. Looking at what the students bring to the classroom and how you can build on this. It is different from putting science into context';*

'… about bringing students' personal experiences into class and relating them to science, links to careers, creating an atmosphere in class where everyone is able to contribute and feels that their contributions are valued';

'… it sort of turns the relevance thing on its head with the teacher NOTICING what the children bring, not the other way round';

'It is "eliciting", finding what your students know already and their experiences'.

Why is a science capital approach important?

'It's important because we need more young people to engage in science in a wider context than just passing exams at the end of school. We need them to be passionate about science and inspired to keep studying beyond school and then make a difference to the world…also to be able to relate what they are learning to their lives!';

'It's about children "seeing" themselves and/or things they relate to within the subject you're teaching, and that ultimately leading to a more diverse group of young people choosing science pathways later on'.

What does it look like in the classroom? Here we had quite a few ideas:

1. The idea of eliciting students' experiences and valuing them came through – finding out about your students, their hobbies and interests is important. Finding out whether anything in science relates to what their parents do at work, e.g. hairdressers use hair dye, car mechanics work with levers, oils, fuels, etc.

2. Set homework tasks for pupils to interview parents on topics covered in lessons: e.g. 'explain to someone at home what a lever is. Then ask them if they use any levers at work'. Parental feedback at parents' evenings was very positive.

3. Parents' assembly to show them experiments they can do at home. If the maths and English leads do it, why can't we?

4. Sharing assemblies, when students share their creative work and explain the science as 'experts' to peers and parents, can be very helpful. There's research suggesting it's vital to change parents' attitudes to STEM due to their influence on children's views.

5. Run 'science for families' and 'engineering for families' at after-school clubs – not teaching either subject, but allowing exploration and linking to careers.

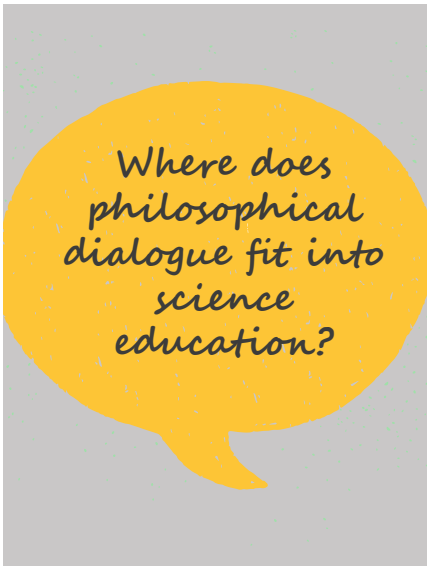
6. Get as many STEM-related visitors – e.g. STEM Ambassadors – into the school as possible to speak to pupils (see www.stem.org.uk/stem-ambassadors).

7. Trips were suggested, especially to science museums and activity centres.

There were concerns that we are adding workload, pressure and planning, especially for those in areas of high deprivation. Alister Talbot (@AlisterTalbot) pointed out that it's not a strain on planning – it's all about making small tweaks to lesson maps using an elicit, value and link approach.

Thanks go to all those who took part in the Twitter chat and contributed their thoughts! See youtu.be/hWWPUIK3xZ0

Jenny Koenig (@JennyAKoenig) is a teacher who combines science and maths teaching at secondary and university



A Question of Science

A growing number of science educators are doing philosophy with children in science. Philosophical questions can ignite students' interest in science and expand their perspectives on science, reality and society. The philosopher Matthew Lipman observed that philosophical inquiry stimulates critical and creative thinking among students, and recent research has found a positive impact of doing philosophy on a range of outcomes for children. In the context of science education, philosophical dialogue may contribute to the discussion of big ideas such as substance, classification, the nature of science and ethically or culturally sensitive issues arising in the science class, such as the theory of evolution or sexuality.

On 18th-19th March at the National STEM Learning Centre, we will host a 2-day event to explore philosophical dialogue in science education. The aim of the meeting is to share and reflect on approaches to doing philosophy in science education, and research on doing philosophy in science education. To find out more or to register, please visit sites.google.com/view/aquestionofscience or contact lynda.dunlop@york.ac.uk

ASE and Science on Stage UK

From 1 January 2019, the Association for Science Education (ASE) has taken over the role of secretariat for Science on Stage UK. We will be responsible for organising the UK presence at events, supporting the dissemination of practice from the European festivals, and enabling networking with teachers from other countries. The next European Science on Stage festival (#SonS2019) will take place in Cascais, Portugal at the end of October 2019. 11 UK teachers from primary and secondary level have been selected to present their teaching ideas.

Winner of the Rolls Royce Science Prize 2018

ASE is proud to announce that Tracey Ellicott, lead teacher at East Wemyss Primary School and member of the ASE Primary Science Committee, is the 2018 Rolls-Royce Science Prize Awards winner. Tracey applied though ASE for the Northrop Grumman Scholarship, was successful and attended the NSTA Conference in Los Angeles in 2017. That spurred her on to apply for the Rolls-Royce Science Prize – over 2,000 entries – that resulted in 6 finalists attending the Award ceremony last November.

Take our survey on the quality and content of ASE's journal publications for a chance to win £50 books voucher! page 33

MARVEL legends join forces to inspire the next generation of engineering superheroes!

The Government's Year of Engineering campaign has teamed up with iconic comic brand Marvel to launch a set of fun educational resources to help students aged 7-11 identify the superhero qualities needed to solve the global challenges that we face.

The exciting new *More Heroes Needed* Marvel resources, which feature iconic favourites such as The Hulk, Black Panther, The Wasp and Iron Man can be found in the schools hub of the Year of Engineering website at www.yearofengineering.gov.uk/schools

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The free Marvel resources aim to challenge engineering stereotypes, encourage a re-evaluation of gender roles in Science, Technology, Engineering and Maths (STEM) careers and showcase to young people that they have what it takes to be real world superhero engineers, playing a vital role in tackling complex global issues.

Since the start of 2018, the government has worked with more than 1400 partners from Apple and LEGO, to FIFA and The Science Museum, to help young people take a closer look at engineering. The aim of the campaign is to encourage more young people from a wider range of backgrounds to discover the opportunities offered by engineering careers.

The best teaching, the best evidence...

Yet despite increasing calls for evidence-based practice in classrooms, science teachers' lives are so busy that it is hard for them to access and effectively implement the best principles emerging from education research. At the 2019 ASE Annual Conference, Best Evidence Science Teaching (BEST) was introduced as a new collection of research evidence-informed resources for effective teaching of difficult ideas, embedded formative assessment and adaptive lesson planning in 11-14 (Key Stage 3) science. These materials are freely available on the STEM Learning website for teachers to use in their own classrooms and were made possible with funding from the Salters' Institute.

BEST is being written and developed by Judith Bennett, Peter Fairhurst, Helen Harden and Alistair Moore of the University of York Science Education Group. We've now published over 500 diagnostic questions and response activities at www.BestEvidenceScienceTeaching.org

The BEST team is hugely grateful and touched by the enthusiastic response to the project from teachers and science educators at the ASE Annual Conference, both at our three sessions and from those visiting our stand. The Conference may be over, but we're already developing research evidence-informed resources for further key concepts in science. We'll be publishing new resources each month in 2019, so follow us on Twitter or sign up to our e-mail list: www.BestEvidenceScienceTeaching.org, @BestEvSciTeach, uyseg@york.ac.uk

BEST
Best Evidence Science Teaching

New Datalogger!

David Brown, a science, technology and arts technician at The Mount, Mill Hill International, trialling a specific heat of water experiment with his new Data Harvest Vu+ Datalogger, won in a recent competition. Keep looking at our @TheASE twitter pages for more exciting competitions!

Young Chemists win 3D printers for school

Year 12 (age 17) chemistry students from St. Mary's Calne School entered the European Systems Safety Society (ESSS) 2018 Schools Competition, based on the theme of 'Hazards'. ASE is pleased to announce that one team from the school won first prize (two 3D printers) and the second team were runners-up.

The brief given to the girls for this competition, run in partnership with ASE and open to Year 7 (age 12) and Year 12 pupils, included the following statement: 'Every day we are surrounded by things, and perform acts, that could harm us. These are known as hazards. However, the presence of a hazard does not automatically mean that we will be harmed.' As a group, the girls had to identify a hazard and explain the consequences and risk assessments, as well as propose solutions to reduce risk.

Iona, who led the winning team, said that '*the exercise was great fun and the whole team worked together very well; we particularly enjoyed creating "Top Trumps" cards, featuring the "dangers of laughing!"*'.

ASE welcomes new President

Sir John Holman is Emeritus Professor at the University of York, and senior adviser in Education at the Gatsby Foundation and the Wellcome Trust. John says, *'I'm honoured to become ASE President. Science teaching has been my career since before I joined ASE in 1972 and I've done it, at school and university, for over 50 years. It's been a privilege to teach the subject I love and it's a greater privilege still to become President of the Association that brings together so many like-minded people across all aspects of science and across schools of all types'*. John will be speaking at the ASE Scotland Conference in March and at the ASE Futures Conference in July at Sheffield Hallam.

ASE 2019: Roving reporter's view!

Roger McCune MBE writes:

ASE returned to Birmingham after a gap of three years. The weather was kind, with little rain; indeed, there were glimpses of blue sky throughout the four days. The extensive programme featured over 500 sessions, with a wide range of speakers contributing to lectures, workshops and debates. The Conference shows ASE at its best; as one delegate said to me after a few hours at the exhibition, *'That was an invigorating way to start the year. I am now motivated and ready to go back into my science lab!'*

The Frontier Lectures, delivered by lecturers from the host university, were again hugely popular. *The Human Zoo*, delivered by Professor Robin May, was a highlight, as was the Association Social; an ideal opportunity to meet with colleagues old and new, with a science magic show from Neil Monteiro as the after-dinner entertainment.

Well done to our Chair, Mary (Whitehouse), who seemed to 'pop' up at every event, always with boundless energy. A big thanks to Nicola Hern and the HQ conference team, and also special thanks to our Conference Secretary, Susie Burr.

For more on the Annual Conference, please see pages 12-15.