

# ISET2015

ON THE RISE OF ASEAN, THE SCIENCE EDUCATION SUPERPOWER  
The International Conference for Science Educators and Teachers 2015  
Kasetsart University, Bangkok, Thailand



## Challenges and successes in Inquiry-based teaching and learning

**Mark Windale**

Centre for Science Education, Sheffield Hallam University  
United Kingdom

[m.windale@shu.ac.uk](mailto:m.windale@shu.ac.uk)

As countries strive to be increasingly more competitive in the global market they rely more and more on the science and engineering based industries and on a work force that possesses the analytical, process, creative and critical thinking skills developed through science. Science as a subject and science teaching and learning in schools is thus of paramount importance. However, is science in schools as popular as it should be with students? How do we transmit the importance, fascination, and enjoyment of science to all pupils to help increase their active participation, motivation, and achievement in school? Are students being actively engaged in the learning process? Are students developing the desired skills and capabilities through their science experience?

To address these needs countries across the world are attempting to make a pedagogical paradigm shift in science teaching and learning from teacher-centred to inquiry-based approaches, and at the same time implement context-based and constructivist approaches in science classrooms. However such a significant paradigm and cultural shift is extremely challenging for both teachers and students. Are too many assumptions made when attempting to make such a change? Such a change in classrooms requires ownership of change; active participation of all; country wide capacity building and continuing professional development (CPD) with all the necessary school-based support and steps put in place to enable teachers to achieve the enormous paradigm shift. It also requires the development of comprehensive teaching resources to support effective classroom implementation and embedding. To support and facilitate these changes in three countries in South East Asia the Centre for Science Education (CSE), Sheffield Hallam University, UK, has worked in partnership with the British Council, BG Thailand and the ministries of education of the countries.

This paper will outline the outcomes of the baseline research carried out that has helped to identify the challenges encountered by teachers and educators in the countries that have shaped the country specific programmes of capacity building, CPD and development of teaching

# ISET2015

**ON THE RISE OF ASEAN, THE SCIENCE EDUCATION SUPERPOWER**  
The International Conference for Science Educators and Teachers 2015  
Kasetsart University, Bangkok, Thailand



resources. Through case studies the paper will detail how the challenges have been addressed, and the steps to success put in place to enable achievement of the programme aims.

The aims of the programmes have been firstly to develop a core group of science teachers, educators, science supervisors, doctoral students and ministry of education staff as core expert curriculum developers able to write innovative teaching resources that effectively put into practice inquiry and context--based teaching and learning, 5E or 7E learning cycle, the development of critical and creative thinking skills, personal capabilities and key skills. Secondly, through the core team develop comprehensive sets of inspiring, high quality teaching resources to support the teaching and learning of the upper primary and/or lower secondary curriculum. Thirdly disseminate and embed the teaching resources across all education areas, states or clusters of the country through CPD, involving a ‘train the trainers’ programme for science supervisors and master teachers from each area, face to face training of teachers and follow-up coaching and mentoring, and school-based support through reflective partners and action research strategies in schools across each education area. Finally develop the scientific capability, team working, problem solving, communication, leadership, ICT and thinking skills of students across the country through the use of the teaching and learning practices and resources.

This paper will not only outline the baseline research, philosophies and models underpinning the project, but also the outcomes of the thorough independent evaluation that has evaluated all components of the project and that is influencing the continued development of all the project components.