

INSTEM Case Study – Continuing University-School Partnership for Research and Learning

The INSTEM Project has enabled two partners to continue to engage successfully in developing and researching Inquiry-Based Science Education, following an initial partnership through the FP7 funded Science Education for Diversity Project. This project was based on the premise that science appears to be a more popular choice of subject for further study/career in non-EU countries, where decreasing interest in science is apparent, and is a cause for concern amongst policy-makers. In this project, the University of Exeter worked in partnership with International collaborators and UK schools to:

1. Identify patterns of difference between attitudes to and beliefs about science education across different groups in different countries. Please note that although groups were identified by, for example, gender, country of origin, religious belief etc, the project also developed a focus on creating identity groups according to students' and teachers' own interests and perceptions of science and themselves.
2. Identify different approaches to the teaching and learning of Science to diverse students in different international contexts
3. Use the insights from 1 and 2 to develop a theoretically driven framework for practice
4. Work in partnership with schools to test the impact of this framework in practice.

In the SED project, school partners were engaged early on with the project as participants in the scoping work undertaken, and some partners then continued to work collaboratively with the research team to develop and test the framework for practice. This framework, called 'Guided Collaborative Inquiry' used an approach to Science learning which draws on IBSE, Mastery Learning, and Teacher Action Research to attempt to develop an approach that enables teachers to support students' with learning specific scientific content whilst at the same time enabling them to ask their own questions and guide their own inquiries into science, according to their diverse backgrounds, interests and needs. Bodmin College and the University of Exeter were key partners in testing this approach and collecting data about its' impact with groups of children aged 12-13 and 14-15 of varying 'abilities', genders and interests.

Following the end of the SED project funding, we had found some encouraging results, with students expressing support for the approach and an increased interest and enjoyment of science. However, there were aspects of the approach that were concerning for teachers in managing expectations and performativity requirements despite their belief in the general approach. There was also limited time and opportunity to explore with the students' their particular 'science identities' and how these interacted with the change in pedagogy. It is likely that, despite these gaps, it would not have been possible to capitalise further on the initial research and strengthen both the evidence base for the particular inquiry approach taken and our understanding of its impact on particular pupils and teachers, without further funding.

The INSTEM project, in which both the University of Exeter and Bodmin College are partners, has enabled us to continue our research partnership. We have worked together to contribute to the broader understanding of IBSE by contributing insights to the overall review of EU projects in this area, and are beginning to use these insights to further develop our own approaches to teaching and learning in Science. Through a national workshop, we have gathered further information to help us understand the perceptions of some teachers and students about the IBSE approach used in the SED project, and share these insights with national stake-holders alongside broader insights into IBSE. In the final stages of the INSTEM project, we hope to undertake some further research to capitalise on the SED project and strengthen our evidence base in relation to the specific theoretically informed pedagogical approach we originally tested. In particular, we hope to design a questionnaire that will enable us to gain insights into students' 'science identities' and then interview a sample of students who have undertaken an IBSE approach in their learning (alongside other pedagogical approach to science learning) and identify any patterns in understanding whether IBSE engages a broader range of students' (based on their own science identities) when compared with other approaches.

The cohort of pupils who undertook IBSE work as part of the project are being monitored and their achievement is being tracked and compared to their peers who were not part of the project. One clear outcome of the collaborative work between the University of Exeter and Bodmin College has been for teachers at Bodmin to think more deeply about the need for evidence based research. Not only is there an excitement in anticipation about the outcomes of this particular project, there is also an understanding that pedagogical practice should be underpinned by solid research. Many teachers have now joined the Evidence Based Teachers' Network (EBTN - <http://www.ebtn.org.uk/>) and it is clear that staff meetings are now infused with references to 'what the evidence says works' rather than anecdotal accounts of successful teaching.

There is also a need to engage researchers and teachers in discussion about effective teaching and the work done between Exeter and Bodmin prompted a Royal Society blog on IBSE.

<http://blogs.royalsociety.org/associate-schools/2014/09/10/science-in-school-with-bodmin-birdsand-instem/>

A further benefit of the INSTEM project in developing and strengthening University-School Research Partnerships is in our approach to future bidding for research funding. Bodmin College and the University of Exeter have maintained a partnership that enables us to work together for relevant bids for future funds, with a current focus on Horizon 2020. A recent bid to the Science Learning + from the University of Exeter drew on these links to demonstrate ongoing school-University research engagement, this time into the relationship between schools and informal learning centres in learning Science by stimulating interest, questions and subsequent inquiry.

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