IDeas, Evidence & Argument in Science

CPD Training Pack

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Introduction

This pack consists of a set of training materials for use on continuous professional development courses and a Resources Pack to support the teaching of ideas and evidence in school science. The pack was written to support the teaching of this component of the science national curriculum (Sc1) – a new and unfamiliar area for many teachers. The material here draws on the work undertaken with teachers involved in the ESRC two year funded project on 'Enhancing the Quality of Argument in School Science'. The production of these materials was funded by the Nuffield Foundation.

The materials offer 6 in-service CPD sessions, which take approximately half a day each. Ideas and approaches for lessons are illustrated using materials provided in the Resources Pack.

The pack was designed to address an important issue. It was our belief that in presenting scientific ideas and their supporting evidence to school students, the opportunity to consider the arguments for the scientific idea and other competing theories was essential for two reasons:

- First, research evidence suggests that the opportunity to consider why the wrong idea is wrong is *as important* as understanding the justification for the scientific idea. That is – knowing why the wrong idea is wrong matters as much as knowing why the right idea is right[1].
- Second, engaging in argument would provide school students with a better insight into the nature of scientific enquiry and the ways in which scientists work.

More fundamentally, our view is that science has been so successful because its ideas and theories depend on a body of incontrovertible evidence. Yet, as school science, rushes from one topic to another, students are too often asked to accept many ideas without the opportunity to consider why they are believed to be true. Why, for instance, do we believe day and night are caused by a spinning Earth, that matter is made of atoms or that plants photosynthesise and take in carbon dioxide during the day to make their own 'food'? Most would agree that the arguments for these beliefs are comparatively downplayed or even worse, ignored. To ask school students to accept and memorise what the science teacher says without any concern for the justification of those beliefs is poor currency. Poor currency because it leaves them unable to explain those beliefs to anybody else but, more importantly, poor currency because it fails to lay bare the enormous intellectual achievement of those who first realised the scientific explanation and the struggle they had in winning the hearts and minds of a sceptical public. We hope that these materials will offer something to redress the balance.

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1 Hynd, C., & Alvermann, D. E. (1986). The Role of Refutation Text in Overcoming Difficulty with Science Concepts. Journal of Reading, 29(5), 440-446.

Palmer, D. (2003). Investigating the relationship between refutational text and conceptual change. Science Education, 87(663-684).

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For further information about the EPSE Research Network, see: www.york.ac.uk/depts/educ/projs/EPSE.

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