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McGregor, Deb and Woodhouse, Fiona

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■ Deb McGregor  
■ Fiona Woodhouse

## Continuing Professional Development for science teachers: what does research say?

### Continuing Professional Development described

Continuing Professional Development (CPD) can take many forms. It may arise through individual endeavours, collaborative working with others within a school or professional network, or it may be supported by external expertise (from a local authority, university, subject associations or other private provider). Professional learning can be initiated or consolidated by reading and engaging with subject literature, the educational press, curricular documents or research articles. It may occur through participation in meetings, coaching, mentoring or co-teaching with others, as well as attending formal courses or enrolling on a higher degree programme (e.g. masters or doctoral). These experiences, whether serendipitous, planned, formal or informal, offer opportunities to engage in: *'...reflective activity designed to improve an individual's attributes, knowledge, understanding and skills. It supports needs and improves professional practice'* (Training and Development Agency (TDA), 2009).

### Recent developments

The publication of the CPD Strategy in 2001 by the Department for Education and Employment, and the extension of the TDA schools' remit to include CPD in 2005, have highlighted professional development needs. This has been emphasised by the introduction of professional standards and performance management and the development of initiatives, such as the Masters in Teaching and Learning currently designed to further professional progress of Newly Qualified Teachers and Heads of Department. More specifically in science, there has been development of CPD that *enthuses, inspires* and illustrates *impact*, through expansion of

the courses offered at Science Learning Centres (SLCs), which are also now beginning to embrace the Science, Technology, Engineering and Mathematics (STEM) agenda. The ASE, as well as other professional associations, is concerned with the continued development of its members and has introduced the Chartered Science Teacher award. Industry has also been keen to encourage this kind of CPD that spreads effective and influential practice.

### CPD in science teaching

A study of teachers' professional development (Leaton Gray, 2005) indicated that science educators benefited from the richest CPD opportunities, compared to other school subject areas. The national agenda for CPD in science is driven by the SLCs. However, unlike other professions, such as dentistry and medicine, there are currently no statutory requirements for in-service programmes that science teachers attend. The recent report into Science and Mathematics Secondary Education for the 21st Century suggests eight recommendations to improve science teaching and two of these refer directly to effective CPD for science teachers: *'Continuous professional development (CPD) is central to effective career development for all teachers. Subject-specific CPD is especially important for STEM teachers who need to keep up with the latest developments in their fast moving subject areas'* (Walport, 2010).

### Influences on the quality and impact of CPD

Different types of professional development may be more or less successful depending on why the CPD is undertaken (is it compulsory or voluntary?); what it is about (improving

subject knowledge, pedagogic practice or policy dissemination?); how it is focused to achieve professional outcomes (providing support for a potential area of development or a burning passion of the individual); its longevity (extent of the professional learning opportunity; whether it is for a day or two years can influence the depth of impact); teacher involvement (how far action research, for example, might require a systematic scrutiny of pedagogic practice or subject understanding) and, subsequently, how closely the impact of the CPD is monitored and measured. The studies mentioned below explored some of these influences on successful CPD.

### Messages about effective CPD from research

The increasing pressure on teachers in the classroom prompts the questions: *'Why should we focus on CPD?'* and *'What are its benefits?'* Research indicates that teachers' CPD activities are important for schools to develop and sustain educational success. Muijs and Reynolds (2000) also indicate that there is greater potential for school and classroom improvement where teachers are able to reflect, access new ideas, experiment and share experiences. Other studies suggest that extended opportunities are needed to reflect on personal practice (perhaps videoed for in-depth scrutiny) and supported by formative professional discussions.

Webster-Wright (2009) reviewed research into CPD and found that many instances were episodic updates of information delivered in a didactic manner, separated from engagement with authentic learning experiences. Professional practice can be shaped by short CPD programmes that also have value for the students if they are well planned. Lydon and King (2009: 63), evaluating the benefits of a short one-off



CPD activity, concluded: '...the results ... suggest that short-duration, well-structured CPD episodes, based on practical and interactive science teaching ideas, presented to whole science departments by experienced presenters, can have long-term impact on those involved'.

Webster-Wright (2009: 703), however, suggests that more effective CPD is longer term, 'continuing, active, social, and related to practice'. This is also supported by other studies. Fraser *et al* (2007), in a review of the research into the CPD delivered to introduce Cognitive Acceleration through Science Education (CASE), tentatively suggested that formal planned opportunities, which are essentially transmissive, are unlikely to result in transformative learning for teachers. They (*ibid*: 165) advocated that the inclusion of both formal and informal planned opportunities, as well as having greater ownership and control of the process, are more conducive to change. Similarly, McGregor and Gunter (2006: 41) evaluated some long-term INSET that engaged the teachers in authentic (task of familiar context that provides genuine learning opportunity) activities and found that this influenced the teachers' pedagogy in a variety of ways. Teachers described how they had shifted from 'entertaining' to 'engaging' pupils in a lesson, had begun to 'informally assess pupils' understandings through their discussions', leading to identifying 'improved performance in science investigations' and departments becoming 'less worksheet-orientated'.

Developing and informing effective practice is the powerful argument for CPD. Engaging in CPD is essential so that, as Kind and Taber (2005: 253) indicate: 'being a fully professional science teacher means seeing teaching not only as an evidence-based activity, but also to some extent as a research-based activity'.

Teachers should engage in CPD because it supports their professional learning and consequently their professional knowledge and understanding about the learning process. Working with others in their own institution or within a professional network in a collaborative way can result in positive outcomes (Cordingley *et al*, 2003: 2) for teachers (such as improved confidence and changed practice) and pupils (such as improvements in performance and enhanced motivation).

In science, we are constantly striving to respond to challenges, due to the changing developments in subject

knowledge, deeper understandings about the nature of science pedagogy, altering curricular demands and examination requirements. Responsive practice in the classroom needs to be underpinned by effective and meaningful CPD to ensure successful professional development. For the individual teacher and their schools, the benefits of CPD can be significant, long-lasting and provide positive results for both their pupils and their institutions. Perhaps with the report on Science and Mathematics Secondary Education for the 21st Century, individual science teachers will be able to demand opportunities for their own CPD that:

'...provide[s] new knowledge, ideas and skills relevant to the needs of the teacher ... [is] delivered in a manner appropriate to the content, by a skilled practitioner... [is] collaborative and sustained, and provides teachers with opportunities for discussion and exploration with colleagues...[providing] experimentation and reflection, away from the pressures of the classroom' (Lydon & King, 2009: 67).

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## ASE Election results

The Chair-elect for 2010-2011 will be Lynne Horton.

At the May meeting of Council, the following members were elected:

### International Committee

Graham Jackson (Chair)

Mike Driver (Secretary)

### Publications Committee

Louise Nelson

### 11-19 Committee

Alastair Gittner

Frances Evans

### Primary Science Committee

Barbara Harrison

Philippa Minto

### Laboratory Technicians' Committee

Julia Milligan (Secretary)

Gill Halton

Philomena Muggins

### Research Committee

John Oversby (Chair)

Kristina Stutchbury

Penelope Robotham

### Safeguards Committee

Peter Borrows

Joe Jefferies

Jeremy Airey

Deb McGregor and Fiona

Woodhouse are members of the ASE Research Committee.