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Research for Teachers
The role of the specialist in the teacher's CPD

published: Thu May 01 10:41:37 GMT 2008

- Overview
- Study
- Case studies
- Further reading
- Appraisal

Knowing what makes continuing professional development (CPD) effective is important both to teachers planning their own professional development and to schools which want to build self-sustaining professional development and learning skills and aptitudes whilst getting value for money/resources invested.

The findings of three systematic reviews of CPD have already pointed to the important role played by 'experts' or specialists, although this was not their main focus. For this TLA research summary we have explored the fourth review in the series which set out to unpack what specialists contribute to CPD and how they do it - in contexts where there is evidence of a positive impact on pupil learning. The review's findings were derived from 19 studies which the reviewers judged as offering the most relevant and trustworthy evidence.

The reviewers noted how the specialists invested much time and effort in the design, delivery and support of CPD programmes and activities. They looked for studies that explored the impact of CPD on both students and teachers. The specialists introduced the teachers to new knowledge and approaches. But they also supported teachers over time in using their new knowledge to develop their skills and make changes to their practice. Specialists helped teachers to use their new knowledge in practice in a number of ways. These included:

- modeling the new ideas in a classroom setting
- supporting the teachers to make changes through sustained mentoring and coaching
- helping teachers to collaborate with and support one another.

The reviewers concluded that for CPD to be successful it was important that specialists paid as much attention to adult learning and to teachers' needs, as to the transmission of new and 'expert' knowledge about classroom teaching and learning. When teachers were supported by specialists in this way, they learned new approaches to teaching, more about their subject, and more about pupil learning. This in turn helped them to enhance their pupils' engagement, confidence, attitudes, and performance.

In this summary we outline the key features of effective CPD facilitation by specialists and illustrate them with

examples from the original studies. We think teachers will be keen to know how to make best use of specialist expertise for developing their own practice and to consider strategies they might use to increase the effectiveness of the support they offer to colleagues. Specialist providers of teachers' professional development (including ASTs and CPD leaders) will also find the summary helpful.

Reference
All three previous systematic reviews of continuing professional development can be found on the Evidence for Policy and Practice Information and Co-ordinating (EPPI) Centre website (see further reading section). The three reviews are also featured in two previous TLA research summaries:
- Teachers' professional learning
- The impact of collaborative CPD

Cordingley, P. et al. 'What do specialists do in CPD programmes for which there is evidence of positive outcomes for pupils and teachers?' *Research Evidence in Education Library*. London: EPPI-Centre, Social Science Research Unit, Institute of Education, 2007.

Back to top

Overview

Why is the issue important?

Knowing what makes continuing professional development (CPD) effective is important both to teachers planning their own professional development and to schools wanting to build self-sustaining professional development and learning skills and aptitudes. The findings of three earlier systematic reviews of CPD have pointed to the important role played by 'experts' or specialists.

What did the research show?

When teachers were supported by specialists, they learned new ways of teaching, more about their subject, and more about pupil learning. At the same time, taking part in the CPD enhanced the teachers' confidence, openness to new teaching approaches, and willingness to experiment and take risks. All of this then helped them to enhance their pupils' engagement, confidence, attitudes, and performance.

How was this achieved?

The specialists not only introduced the teachers to new knowledge and approaches, they also supported teachers over time in using their new knowledge to develop their skills and make changes to their practice. Specialists helped teachers' to use their new knowledge in practice in a number of ways, including:

- modeling the new ideas in a classroom setting
- supporting the teachers to make changes through sustained mentoring and coaching
- helping teachers to collaborate with, and support one another
- scaffolding teachers' growing independence as professional learners.

How was the research designed to be trustworthy?

The reviewers followed the detailed procedures for systematic reviewing developed by the EPPI Centre, beginning with the formulation of the review question. They used a systematic search strategy. The studies were keyworded to produce a map of the literature and then assessed for their quality and relevance using transparent and consistent criteria by two reviewers. The results of the 19 individual studies which met the criteria were then synthesised to answer the review question. The review was quality assured and peer reviewed by the EPPI Centre.

What are the implications?

The study shows the importance of:

- teachers finding opportunities to watch specialists model new or innovative practices and work with colleagues to explore and experiment with new approaches with the aim of improving a particular area of teaching and learning
- the need for teachers who are developing practice collaboratively with colleagues to seek out specialist expertise and evidence about what is likely to work and the underpinning rationale
- the needs for 'expert' teachers within the school who support to colleagues to have opportunities to develop their skills in supporting professional learning.

What do the case studies illustrate?

The case studies show, for example:

- the value of seeking support from other experts, such as scientists and artists, who can provide a new dimension to teaching and learning
- how teachers gained from being supported to engage with academic research (one element of the process highlighted in the review)
- how a group of teachers in a secondary school experimented with alternative approaches to delivering design and technology
- how an external specialist helped a group of teachers work together as a team and how they benefited from the resulting peer support.

Read the RfT

Back to top

....

Study

What did teachers gain from the input and support provided by the specialists?

The reviewers noted how CPD programmes involving specialists enabled teachers to learn more about their subject, more about learning, and new ways of teaching. At the same time, taking part in the CPD enhanced the teachers' confidence, openness to new teaching approaches, and willingness to experiment and take risks.

Different studies illustrated different combinations of these approaches. For example, in one study (McCutchen et al) the CPD helped with subject learning - the teachers learned more about teaching reading. Specifically, they learned:

- how their insights into word sound were influenced by their knowledge of word spellings
- the typical sequence of development in children's phonological awareness
- how to use children's spelling as a diagnostic tool in assessing their students' phonological awareness
- the importance of developing pupils' knowledge of letters (orthographic awareness) and letter patterns, and
- the importance of explicit comprehension instruction.

In this study, the teachers' increased content knowledge led to increased confidence, as this teacher explained:

'What I'm doing now isn't dramatically different from what I used to do before. But what is different is that now I have a clear idea of exactly what I want my students to learn. Now I am more focused on the learning and my students seem more focused too'.

Another study (Cho), focused on an openness to new teaching approaches and willingness to experiment. The teachers in the Cho study learned about constructivism. Specifically, they learned how to:

- connect concepts to student lives or experiences
- teach through student-centred activities, and
- stimulate students to get actively involved in learning through asking questions, one-minute readings, stories etc.

To begin with, these teachers had felt they could not teach without textbooks, but the researchers were able to support them to develop teaching materials based on what they thought would work with their students.

Practitioners interested in finding out more about constructivism may like to read our earlier RoM about Jerome Bruner.

Practitioners may also like to read a case study which shows how a teacher worked with science and music specialists and the impact the work had on pupils.

How did the teachers' changes in practice affect pupil learning and achievement?

The studies in the review reported positive changes in pupil learning and achievement in relation to:

- knowledge of scientific concepts and problem solving
- mathematical skills
- literacy skills
- engagement with classroom activities
- reasoning and problem solving skills, and
- use of ICT.

The review also reported on affective changes among pupils. These included:

- enhanced pupil engagement in classroom activities (interpreted as an outward sign of an increase in motivation)
- increases in pupil confidence and self-esteem, and
- improved attitudes to learning.

Improvements were concrete and included both specific enhancements to the targeted area of development and more generic positive outcomes. For example, students' journals in one study (Wilkins) showed evidence of enhanced confidence, understanding of mathematics, ability to communicate and attitudes towards performance, teaching and assessment. In the same study, average scores on end of year tests were significantly higher in graphing and computation. Teachers in another study (Bryant et al) exemplify the problem solving through observed improvements in their poorer readers' fluency ability, and in struggling pupils' ability to break down multi-syllabic words into smaller parts.

Another study (Jacobsen) illustrates benefits in use of ICT, pupil engagement, confidence and reasoning on a combined basis. In this study, teachers introduced their pupils to new ways of using technology (focusing on how technology might best serve the task in hand) and created opportunities for pupils to work collaboratively to solve problems, share knowledge and responsibility, found that pupils' work exceeded expectations - their engagement with tasks was more sustained and they worked at higher levels of thinking and reasoning.

How did the specialists contribute to the CPD programmes?

All of the specialists combined initial 'input' sessions with a programme of ongoing support for the teachers as they began to implement changes in their own classrooms. Most of the studies described how the specialists also encouraged and guided the teachers in supporting each other. In the initial input sessions, the specialists introduced the teachers to new knowledge and new ways of doing things. In the support sessions, the specialists worked with teachers to interpret and implement the new knowledge or skill, for the teachers' own contexts and starting points. The sessions also focused on planning consequent changes to the teachers' practice. The specialists contributed through modelling, encouraging and undertaking observation, around

feedback, coaching, and planned workshops and informal meetings for discussion. Contact time with the specialist was spread regularly across the programme (usually between one and three terms) and was at least monthly, with individual sessions frequently lasting more than two hours. CPD activities mostly took place during school hours and on school premises.

This approach to professional development enabled the specialists to support the teachers to implement real time changes in their practice and ensure the changes were closely connected with the teachers' concerns about their students' learning, their students' responses to new approaches and the evidence about the new approach from elsewhere.

The review identified a number of specific actions which the specialists took to develop teachers' classroom practice and thereby enhance pupil learning. These included:

- making the research evidence base available
- making explicit links between professional learning and pupil learning
- facilitating teachers' independence, autonomy and control
- taking account of teachers' starting points and the emotional content of learning
- encouraging experimentation
- encouraging peer support; and
- helping teachers embed CPD within school goals and leadership.

We look at each of these features in detail in the sections that follow.

What kind of knowledge did the specialists make available to teachers?

In all of the studies, specialists were instrumental in making teachers aware of theory and research evidence on:

- particular aspects of teaching and learning
- content-related strategies, and
- generic teaching and learning strategies.

For example, in one study (Greenwood et al), the specialists introduced teachers to a range of evidence-based reading interventions, such as 'shared book experience', 'partner reading', 'class-wide peer tutoring' and 'reciprocal teaching', from which teachers selected those they wished to develop and implement. For a practice to be included in the review as 'evidence-based', it needed to have been based on evidence linked to improved student learning from at least one empirical study.

In another study (Swafford et al), the specialists ran mathematical 'content' courses, which addressed probability and statistics, geometry and algebra using a 'teaching via problem-solving' pedagogic approach. Companion research seminars reviewed and discussed research findings on students' thinking in each of the three content areas and the teachers reflected on the implications of these for classroom teaching.

The teachers who took part in this study also attended seminars led by the researchers which analysed generic teaching practices including: alternative assessment, co-operative group work, classroom talk, worthwhile mathematical tasks, and writing in mathematics. The researchers presented suggestions for how to implement the practices, which the teachers discussed. The researchers also invited the teachers to share ideas and successful practices with each other.

Practitioners may like to read a case study which shows how a group of teachers worked with a researcher to produce a professional user review of research. Engaging with research helped the teachers learn how research evidence can make an impact on classroom practice.

Practitioners may also like to read a case study which shows how a head of a mathematics department used research as a stimulus for developing his colleagues' classroom practice.

How did the specialists link teacher learning with pupil learning?

The outcomes of all the studies suggest that close links were made between teachers' and pupils' learning, but a substantial minority of the studies reported explicitly and in detail on the ways in which specialists helped teachers connect the two. Sometimes this involved exploring and responding to teachers concerns about pupils and sometimes it involved infusing development activities with exploration of students' responses to teacher learning. Several methods of enquiry were described in the studies by which teachers were able to gauge the effects of their practice from the pupils' perspective including:

- discussions with teachers about their students before the CPD got underway
- student test results
- interviews with and by students, and
- observation and reflection on practice.

For example, one study (Zetlin et al), described how the researchers worked with teachers from five primary schools located in an area of deprivation, where most pupils were living at or below poverty level. At an initial meeting at each school, the researchers led a discussion focused on the achievement patterns that concerned school staff. These included that:

- large numbers of pupils were functioning well below national norms in reading
- most of the least adequately performing pupils were not enrolled in any programme that provided intensive instruction addressing the academic areas they had difficulty with
- many of the lowest scoring 'limited English proficient' pupils were not receiving adequate language development support.

The researchers then worked collaboratively with the teachers to design and implement a language-rich developmental programme that integrated oral language with reading and writing. The approach was based on research that suggested that providing low-income children with multiple opportunities to hear, explore and talk about literature during their early school years, allowed them to develop their language to a similar level to that of their more privileged peers.

In another study (Bryant et al) the researchers worked with teachers who felt that their students' limited vocabulary and comprehension skills presented them with enormous challenges, especially when using text-based material. At the teachers' specific request for strategies that would help their students decode multi-syllabic words, enhance their fluency with reading text and enhance their comprehension skills, the researchers gradually introduced the teachers to three evidence-based strategies that were new to all the teachers:

- word identification
- partner reading, and
- collaborative strategic reading.

How did specialists promote teachers' ownership of change?

The specialists were all explicitly involved in handing over control of the learning to the teachers. They used a range of strategies for doing this including:

- involving teachers in designing teaching and learning activities whilst providing intensive support which they gradually withdrew
- modelling new approaches and supporting teachers in practising different aspects with their classes
- making some teachers 'champions' or leaders of their colleagues' learning.

These specialists supported teachers to introduce very specific and focused teaching approaches and curriculum content. For example, one study (Wilkins) involved training experienced teachers to be resident mathematics specialists. They were supported in the process of designing teaching and learning activities and in turn gave support to their colleagues in the techniques they developed.

The teacher received training from an external specialist on three Saturday mornings and four after school sessions throughout the school year. The teacher was given the first unit for a topic within the mathematics curriculum. It included discovery lessons, student projects and activities, assessment techniques and journal prompts. The teacher specialist used the information to prepare a second unit of instruction. The resident mathematics specialist used regular staff development sessions to train fellow teachers and to provide continuing support and training in these techniques. The teacher specialist prepared further units after discussing the experience of the first two units, including student responses to the assessments and the journal prompts. The units were then incorporated into the programme for the following school year. How the specialist handed over control of the learning to the teachers is summarised in the diagram.

In another study (Cho), teachers attended one-week winter workshops to help them understand science-technology-society and constructivism for science teaching. They also developed a unit for teaching in their classrooms. During the spring term they taught the unit and shared their experiences and problems with other teachers in four three-hour meetings during consecutive weekends. They also learned more about constructivist teaching strategies. During a one-week summer workshop, the teachers evaluated the unit and their teaching experiences. They then extended and improved the units. How the specialist handed over control of the learning to the teachers is summarised in the diagram.

How did specialists encourage teachers to experiment?

In most of the studies there was explicit reference to specialists encouraging teachers to experiment in their practice. Examples of such encouragement included:

- teachers watching experimentation modelled by expert teachers; and
- teachers experimenting with ideas and approaches themselves.

Experimentation modelled by expert teachers

One example of how teachers watched experimentation modelled by expert teachers came from a study (Sandholtz) of two professional development programmes designed to help teachers use technology effectively. The participants were able to observe the realities of incorporating technology into classroom teaching. As well as observing innovative teaching strategies that worked smoothly, they saw the experts improvising or abandoning their plans when equipment wouldn't work. This inspired the teachers to do the same. A teacher commented:

'The ability to experiment is really critical. Two years ago, I would not have imagined that I would have the technology that I have and the freedom to play with it like I have ... we are using technology in very different ways and not coming out of a mould'.

Teachers experimenting with ideas and approaches themselves

A study (Jacobsen) which involved teachers learning to integrate technology into their teaching, showed how teachers were encouraged to experiment with ideas and approaches themselves with support from expert teachers. To encourage such risk taking, specialists took steps to secure peer support (ie. reciprocal vulnerability) - see the next section. Experimenting with ideas and approaches gave teachers a sense of renewal about their professional careers, as these teachers (from the Jacobsen study) commented:

'We're taking our teaching style, we're adapting it and implementing new curriculum ideas, new teaching methodology, but it's all based on where we want to grow from and what we want to do'.

'[Professional development] happens every day that I come to school. They [the expert teachers] made me think, reflect, challenge my practice, read and put into practice what I thought about, but sometimes just did not get around to because I was always too busy'.

Programmes that encouraged experimentation were successful at enabling teachers to adapt the content of the CPD to their individual circumstances. The evidence also suggested that experimentation helped increase teachers' confidence in their practice. Experimentation was therefore an important element in facilitating professional learning and connecting it with student learning.

Practitioners may like to read a case study which shows how a group of secondary teachers experimented with alternative approaches to delivering design and technology in order to improve boys' behaviour and effort in the subject.

Why was peer support important?

There was evidence in all but two of the studies that practitioners were working collaboratively within the programme. In the two exceptions, the specialists worked so closely with the teachers, adopting a collaborative enquiry approach, that they became peers. All of the other specialists took steps to ensure practitioners worked alongside each other to shape the programme, and provide reciprocal support for experiments and widen participants' pool of teaching and learning experiences in the area being developed. They did this in different ways, for example:

- teachers developed team schedules for implementing new teaching strategies. The teachers in each team shared planning and advisory periods and worked collaboratively to address students' needs
- participants attended a programme in teams of two to four so that teachers could support one another when returning to their respective schools.

The middle school teachers involved in one study (Bryant et al) already worked in teams. Each of the two teams that took part in the study consisted of a literacy, science, mathematics, social studies and special education teacher. The researchers introduced the teachers to three reading strategies to address the needs of their students (many of whom struggled with reading), who then implemented them as a team effort. For example, the literacy teacher introduced a strategy, such as word identification, the science and social studies teachers modelled the strategy using subject specific vocabulary, then the strategy was implemented across all classes. Whilst the teachers appreciated the guidance they received from the specialists, they particularly welcomed the on-going support they received from their colleagues. As these teachers commented:

'We meet three times a week and we talk about how each other is implementing it [the strategy]. And those kinds of things help us to hear how other people's ideas of how they are implementing it and how it's working in their room'.

'It pulled us together as a team, and it was really nice to meet with other professionals who had the same goals in mind as we do'.

The researchers concluded that when teachers have a shared understanding of, and goals for, their students, team working is an effective model for promoting collaboration and shared planning among teachers. But, they cautioned, time must be allocated for teachers to share their personal knowledge about their students and teaching.

Another study (Sandholtz) we referred to earlier reported on two technology CPD programmes that were specifically designed to foster on-going collaboration, through teachers teaching other teachers and group reflection. The programmes required teachers to attend in teams of two to four, so that the teachers could support one another when they returned to school. The teachers welcomed the approach, as these comments show:

'It was very valuable to be able to work on a programme alongside our colleagues. It gave us the chance to learn from each other and was a risk-free environment where we were able to get help when having difficulties'.

'Our reflection times have provided me the opportunity to share my fears, frustrations, questions and excitement with others who understand where I am coming from'.

Practitioners may like to read a case study which shows how a specialist helped a group of geography teachers work together as a team and how they benefited from the resulting peer support.

How did specialists involve school leaders?

In some cases, the specialist sought the support of school leaders to act as facilitators, either by agreeing for the CPD to take place in their school, or by providing logistical support, such as cover for colleagues taking part in the programme. In some programmes, headteachers were invited to take part in the CPD themselves or were involved in the planning of the CPD.

The study about the technology CPD programmes (Sandholtz) in particular, went into some detail about the importance of involving the school leader. Involving school leaders gave them greater knowledge of the programme and its goals, and greater understanding of what the teachers were learning. Securing the commitment of the school leader helped ensure that teachers received support when they came to put their new knowledge and ideas into practice. School leaders showed their commitment by:

- providing time for teachers to plan together and reflect on their practice
- showing an interest in what the teachers were learning and implementing in their classrooms
- recognising teachers' efforts, and
- giving teachers authority and flexibility regarding decisions about technology, and
- making technology acquisition a priority.

But not all school leaders showed such commitment and interest. One teacher commented, for example:

'No one from the administration looked at my project although they were invited'.

The researcher suggested that such actions send important messages to teachers and can help or hinder their efforts to change. Other teachers in her study were looking for reassurance from teachers that high expectations also recognised the experimental and risk taking aspects of CPD.

'We are all seeking better ways to implement the use of computers into our curriculum. Sometimes we will not succeed, but we will undoubtedly learn from our failures ... Hopefully, our principals will be supportive of our endeavours and not expect us to have all the answers'.

How was the review conducted?

The reviewers followed the detailed procedures for systematic reviewing developed by the EPPI Centre, beginning with the formulation of the review question. They used a systematic search strategy. The studies were keyworded to produce a map of the literature and then assessed for their quality and relevance using transparent and consistent criteria by two reviewers. The results of individual studies which met the criteria were then synthesised to answer the review question. The review was quality assured and peer reviewed by the EPPI Centre.

The reviewers searched a variety of databases using a range of key terms for studies published between 1994 and 2005. They identified 3,421 titles, abstracts and reports. Full reports were retrieved for 239 studies. Seventy-six studies met all stage 1 criteria and 33 also passed stage 2 filtering. Of these, 22 studies contained teacher and/or pupil impact data. Nineteen of these studies, identified as offering the most relevant and high quality data, were used to create a synthesis of findings (see references below for details).

Most (57) of the 76 studies that were able to be included in the systematic map came from the USA. The review covered both primary and secondary schools. The curriculum focus of the studies included science, mathematics, literacy and ICT. Most of the studies involved collaborative rather than individually-orientated CPD. All of the studies involved specialists working with teachers. Of these, the majority (53)came from outside schools, mostly from Higher Education Institutes, some (13) from local authorities and some (15)

from other backgrounds, such as consultancies or specialist CPD providers.

What are the implications of the study?

Teachers wishing to make best use of specialist expertise for developing their own practice may like to consider the following implications:

- Most of the studies made explicit reference to specialists encouraging teachers to experiment in their practice. Could you find opportunities to watch specialists model new or innovative practices and work with colleagues to explore new approaches with the aim of improving a particular area of teaching and learning with your classes?
- There was evidence in most of the studies that specialists encouraged teachers to work collaboratively. Whilst the teachers appreciated the guidance they received from the specialists, they particularly welcomed the on-going support they received from their colleagues and benefited greatly. Could you find opportunities to work over a period of time with a colleague on developing strategies for enhancing your pupils' achievement in a particular area of need?
- Not all the specialists referred to in the studies were external to the school. Could you make your school CPD coordinator aware of specialist skills that you may have and your interest in and willingness to learn about making these accessible to your colleagues.
- The specialists described in the review studies brought with them an array of skills, knowledge and methods. They helped teachers to interpret and implement new knowledge or skills, and make changes to their practice through modelling, workshops, observation, feedback, coaching, and planned and informal meetings for discussion. If you're involved in running or assisting in professional development activities, how could you plan to include these activities?

Leaders may like to consider the following implications:

- The schools in the studies reported in the review drew on the support of a wide range of external specialists. Does your school have an up-to-date network of external experts on which to draw? Would it help to consult subject leaders about the recognised specialists in their field?
- Both teachers and pupils gained from CPD involving specialists, but not all staff were involved. How do you decide which staff would benefit from taking part in CPD programmes? Could you work with specialists in your school to identify the CPD needs of fellow staff?
- In some of the studies, the specialists were 'expert' teachers from within the school. Could you do more to provide opportunities, training and support for staff who have areas of expertise or who have taken part in CPD programmes to provide professional development for their colleagues?
- Studies in the review pointed to the different ways specialists could encourage risk taking by encouraging collaborative learning and peer support. What resources (time and supply cover etc) do you make available to ensure such professional learning activities can take place at your school? How do you help internal school specialists plan to hand over control of learning to their colleagues?

Filling in the gaps

Gaps that are uncovered in a piece of research have a useful role in making sure that future research builds cumulatively on what is known. But research also needs to inform practice, so practitioners' interpretation of the gaps and follow-up questions are crucial. We think three kinds of studies would usefully supplement the findings of the review:

- studies that focus equally on the CPD processes as well as the outcomes for participants and for their students
- studies that explore the value for money for the CPD programmes
- studies that compare different approaches to CPD using the same evaluation methods.

What is your experience?

Do you have any evidence regarding different approaches to CPD? Do you have action research or enquiry based development programmes running that explore, for example, working with external or internal subject specialists, such as science and mathematics? We would be interested to hear about examples of effective CPD which involve specialist support in some form, which we could perhaps feature in our case study section.

Your feedback

Have you found this summary to be useful? Have you used any aspect of this research in your own classroom teaching practice? We would like to hear your feedback on this study. Click on the link below to share your views with us.
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References

Studies quoted in the RfT

Bryant D, Linan-Thompson S, Ugel N, Hamff A, Hougen M (2001) 'The effects of professional development for middle schools general and special education teachers on implementation of reading strategies in inclusive content area classes'. *Learning Disability Quarterly* 24: 251-264.

Cho J (2002) 'The development of an alternative in-service programme for Korean science teachers with an emphasis on science-technology-society'. *International Journal of Science Education* 24: 1021-1035.

Greenwood C, Tapia Y, Abbott M, Walton C (2003) 'A building-based case study of evidence-based literacy practices: Implementation, reading behavior, and growth in reading fluency, K-4.' *The Journal of Special Education* 37: 95-100.

Jacobsen D (2001) *Building different bridges: technology integration, engaged student learning, and new approaches to professional development*. Paper presented at the Annual Meeting of the American Educational Research Association, Seattle, WA: April 10-14.

McCutchen D, Abbott R, Green L, Beretvas S, Cox S, Potter N, Quiroga T, Gray A (2002) 'Beginning literacy: Links among teacher knowledge, teacher practice, and student learning.' *Journal of Learning Disabilities* 35: 69-86

Mink D, Fraser B (2002) *Evaluation of a K-5 mathematics program which integrates children's literature: classroom environment, achievement and attitudes*. Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, LA: April.

Sandholtz J (2001) 'Learning to teach with technology: a comparison of teacher development'. *Journal of Technology and Teacher Education* 9: 349-374.

Swafford J, Jones G, Thornton C, Stump S, Miller D (1999) 'The Impact on instructional practice of a teacher change model.' *Journal of Research and Development in Education* 32: 69-82.

Wilkins C (1997) *Effects of a resident mentor teacher on student achievement in mathematics*. Report of a study carried out with the support of the Mid-South Educational Research Foundation.

Zetlin A, MacLeod E, Michener D (1998) *Professional development of teachers of language minority students through university-school partnership*. Paper presented at the Annual Meeting of the American Educational Research Association, San Diego, CA: April.

Other studies included in the review's synthesis

Boudah D, Blair E, Mitchell V (2003) 'Implementing and sustaining strategies instruction: Authentic and effective professional development or "Business as Usual"?' In: *Exceptionality* 11: 3-23.

Ertmer P, Hruskocy C (1999) 'Impacts of a university-elementary school partnership designed to support technology integration.' *Educational Technology Research and Development* 47: 81-96.

Fine J, Kossack S (2002) 'The effect of using rubric-embedded cognitive coaching strategies to initiate learning conversations.' *Journal of Reading Education* 27: 31-37.

Harvey S (1999) 'The impact of coaching in South African primary science InSET.' *International Journal of Educational Development* 19: 191-205.

Klingner J, Vaughn S, Arguelles M, Tejero Hughes M, Leftwich S (2004) 'Collaborative Strategic Reading: "Real-world" lessons from classroom teachers.' *Remedial and Special Education* 25: 291-302.

Lin S (2002) *Improving science teaching through teacher development group: a case study of elementary teachers.* Paper presented at the Annual Meeting of the National Association for Research in Science Teaching, New Orleans, LA: April 7-10.

Martin D, Craft A, Sheng Z (2001) 'The impact of cognitive strategy instruction of deaf learners: an international comparative study.' *American Annals of the Deaf* 146: 366-378.

Reis S, Gentry M, Maxfield L (1998) 'The application of enrichment clusters to teachers' classroom practices.' *Journal for the Education of the Gifted* 21: 310-334.

Sawka K, McCurdy B, Mannella M (2002) Strengthening emotional support services: An empirically based model for training teachers of students with behavior disorders. Journal of Emotional and Behavioral Disorders 10: 223-232.
Back to top

....

Case studies

We have chosen five case studies, all conducted by teachers to illustrate aspects of the review's findings reported in the RfT summary.

The first case study reports on how a teacher worked with science and music specialists and the impact the work had on the pupils.

The second and third case studies explore how groups of teachers used research evidence as astimulus for professional development.

Case study four shows how a gruop of teachers experimented with alternative approaches to delivering design and technology in order to improve boys' behaviour and efford in the subject.

Case study five shows how a specialist helped a group of geography teachers work together as a team and how they benefited from the resulting peer support.

Creating a professional learning community

We chose this case study because it is an example of how a specialist (an experienced local authority consultant) helped a group of teachers work together as a team and how they benefited from the resulting peer support. The study involved the geography department of a comprehensive school in an economically and socially challenging area. At the time of the study, the department was staffed by two NQTs, a history teacher and a new head of department who had only been teaching for four years. There were no existing schemes of work or up-to-date resources.

How were the staff brought together as a team?

Initially, under the guidance of the consultant, the head of department wrote schemes of work a half-term in advance, which had the effect of immediately establishing a basis of continuity in the department through shared, objective-led teaching. Once a shared set of objectives had been established, the consultant organised a twilight training session for all the staff in the department on starter and plenary debriefing sessions. At the session, staff were given the opportunity to take part in a variety of activities and they were given a book of suggested activities. They were expected to include a starter activity in every lesson they taught and make a record of the activity, so that it could be included in the revised schemes of work at the end of the year. Staff immediately began to share resources and ideas both formally, through department meetings, and informally on a daily basis.

At the same time, the consultant worked with the NQTs on how to teach using thinking skills activities, through team teaching with their classes over half a term. The NQTs then shared what they had learned with the more experienced staff - both formally and informally. The consultant also bought two books - Thinking through geography and More thinking through geography by David Leat - for all the staff in the department, so that they could read about thinking skills and try out some of the ideas. Throughout the following academic year, staff tried different thinking skills activities with their classes and shared their successes and failures on a formal and informal basis. They were also tasked with including a plenary activity in all their lessons and making a record of the activity for the revised schemes of work.

Having begun to try out the thinking skills activities, the staff collectively decided to abandon assessing pupils' ability to retain geographical information and to start to determine the pupils' level of attainment based on a specific thinking skills activity. At the beginning of the third year, the head of department created 'must/should/could' prompt sheets for each thinking skills activity to be used when assessing pupil attainment, to help pupils know exactly what was expected of them.

What effect did the CPD have on the teachers?

The teacher researcher asked her colleagues to make a 'reflective narrative', which answered the question, 'Can you describe the changes that have been influential in the way we teach and facilitate learning in the geography department at the beginning of the change, at the present time and in terms of your plans for the future?' She also interviewed her colleagues and kept minutes of departmental meetings. Her data showed that her colleagues:

- had increased their knowledge and experience of delivering thinking skills activities, and as a result they were regularly using thinking skills activities to deliver the aims and objectives of their lessons
- were more focused on facilitating learning rather than delivering information
- regularly used a variety of kinaesthetic and visual activities in their classrooms
- created a range of resources to deliver a three-part lesson effectively
- started to focus on teaching literacy skills through geography in order to improve pupils ability to communicate their geographical findings;
- identified a direct impact on their KS4 teaching, as their new skills were easily transferable, and
- enjoyed working in a department that was centred round teaching and learning.

What effect did the teachers' CPD have on the pupils?

Analysis of the teachers' narratives showed that the CPD had a positive impact on pupils too. Staff felt that pupils:

- were more challenged, and had become more comfortable and experienced at completing thinking skills activities
- were able to express themselves in a variety of ways
- were achieving higher levels through the use of 'must/should/could' prompt sheets
- knew what they had to do to reach and exceed their target levels

- were more aware of their own ability

- were achieving more, having identified what they need to do to improve through Assessment for Learning strategies, and

- were more confident with their roles and responsibilities.

How had the specialist helped?

The teacher researcher concluded that the staff had created a department that was centred round teaching and learning and a place where both staff and pupils felt able to face learning challenges with confidence. Making sure that all staff worked with the consultant, whilst retaining control of their own professional development was crucial. The consultant had helped staff to create an environment that fostered the sharing of good practice and resources on a formal and informal basis in the wider context of drawing on specialist expertise.

Reference

Pinnington, H. (2006) *Creating a professional learning community through thinking skills.* National Teacher Research Panel conference summary.
NTRP: publications

Teaching science creatively

We chose this case study because it shows the value of seeking support from other experts, such as scientists and artists, who can provide a new dimension to teaching and learning. The teacher-researcher set out to explore the impact of innovative teaching methods - teaching science through music - on pupil achievement and attitudes in science. The project involved two Year 2 teachers, a musician, a university research scientist, postgraduate students and 18 pupils.

Staff at the infant school were concerned that science in school was lacking some of the excitement that it once had. They felt that content was being emphasised over investigative skills, and that there was a need for more open-ended, child-initiated learning to stimulate interest and enthusiasm in science.

What support did the external specialists provide?

The teacher researcher developed ideas she had encountered at a creative science teaching programme in her school by leading in-service training. At the first session, she introduced the teachers to a musician who gave them the opportunity to experience some of the activities that the children and staff would be involved in throughout the week. The musician introduced the staff to the water drum (a drum partly filled with water to modify its pitch and timbre) and other instruments.

Following the meeting, the musician worked with the Year 2 children. The children experimented with the water drum and other instruments, and explored sound and rhythm patters. The teachers developed the idea of the water drum with the children. They explored whether the following made a difference to the sound:

- using different materials for the drums

- changing the size of the drums

- using different beaters..

Working with the university team, the children started to look at changing the pitch and loudness of sounds. The activities included investigating hosepipe trumpets, sound measurement, drain pipes and flip flops, musical boxes and wave patterns using a slinky. The activities enabled the children to explore sound in a variety of meaningful ways.
How did the pupils benefit?

Questionnaires carried out before and after the project showed that by the end of the week, most of the

children's attitude towards science had changed from 'happy', 'OK' or 'confused' to 'excited', with most children indicating that they always or usually liked science. Before the study the children had liked science only some of the time. There was also a shift in the children's perceptions regarding their ability in science.

Following the hands-on activities, the children were able to talk about sound and their learning in some depth, for example:

- When the musical box workings were put on the box, the box vibrated. At home when I put my hand on the musical box it vibrates - my hand shivers.
- Big bowls made deep sounds, small bowls made high sounds.
- The metal tray made a high sound out of the water and a low sound in the water.
- Hosepipes can make a loud sound. There's not much sound with a long pipe. The air travels so far you have to blow really hard.

What did the teacher-researcher conclude about her experience of working with specialists?

The teacher-researcher concluded that it was important to:

- be flexible - if an activity does not appear to be working, partners need to adapt activities to the needs / abilities of the children
- develop an effective working relationship between the teachers and the providers
- allow time for the relationship to develop, for example, enable staff to meet the specialists before the workshops and experience some of the activities
- investigate the impact of the project and share the results with staff.

Reference

Chapman, J. (2006) Creative science. National Teacher Research Panel conference summary. Available from:

NTRP: publications

Creating a professional user review

We chose this case study because it illustrates in some depth how teachers gained from being supported to engage with academic research although this is only one element of the process highlighted in the review. The study involved seven teachers (primary, secondary and environmental education teachers) who had responded to an advertisement to help create a professional user review for sustainable development that would help 'connections between research and practice in environmental education'. All the teachers were passionate about education for sustainable development (ESD) and were keen to learn more about the topic. They found their involvement in the project helped them see how research evidence can make an impact on classroom practice. The outcome of their work was a 'professional user review' of research.

How did the teachers engage with research?

The professional user review was commissioned by the British Educational Research Association (BERA). Professional user reviews are designed to inform practitioners about current, reliable research in particular fields of education, with the specific aim of encouraging them to make use of research in their own practice. BERA has produced similar user reviews on a range of topics including mathematics, ICT and music.

Over the course of a year, the teachers:

- read research articles on ESD and made notes on particular areas of interest
- met with each other and their team leader (a professional researcher) five times to discuss the research and the implications of the research for classroom practice

- communicated with each other about the research by email, and
- conducted a small-scale research project in their own schools - putting into practice the connections they had made with the research.

Some of the teachers attended BERA conferences where they reported on the project and took part in discussions with researchers and teachers.

By the end of the project, the teachers had created a four-step model for using research:

- identifying questions to ask of the research
- reading the research and identifying points of interest
- exploring connections between these points and classroom practice
- reflecting on lessons learned and ways forward.

How did engaging with research impact on the teachers' professional lives?

The teachers reported that engagement with the research had helped them to:

- update their knowledge on current issues
- feel re-invigorated
- rethink their approaches to teaching, such as refining their questioning skills
- evaluate their current practice
- adapt resources and schemes of work
- explore, refine and/or justify their beliefs and their knowledge of the underlying evidence, and
- become interested in engaging further with research.

Through taking part in the project, one teacher, for example, discovered an area of research she found particularly interesting - mainly because she didn't believe it. The study had found that pupils did not really understand the word 'pollution' and that they could not give examples of different types of pollution. She carried out similar research to see if the same was true of her own class and found that it was! Afterwards, she was much more aware of the importance of regularly questioning pupils to test their understanding. After the project, she organised an opportunity to feed back on what she had learned from the experience to colleagues and started to adapt resources and schemes of work to take account of what she had learnt. She is now keen for her colleagues to get involved with research to:

- improve their teaching
- re-motivate them about their subject
- meet different and interesting people.

Reference

Clark, A., Dawson, L., & McLeod, S. (2004) *Teachers engaging with and in research: Creating a Professional User Review of Education for Sustainable Development*. National Teacher Research Panel conference summary.

NTRP: publications

How can research inform the way we teach mathematics to boys and girls?

We chose this case study because it shows one way teachers used research as a stimulus for developing their classroom teaching. The head of a mathematics department at a boys' grammar school, set out to:

- identify what was known about gender differences in learning mathematics at secondary school by reading existing research literature
- find out the views of the mathematics teachers in his department concerning the impact of gender on learning mathematics
- use the similarities and differences between the research findings and the teachers' perceptions as a stimulus for developing classroom teaching.

The head of mathematics was keen to use research as a way of opening up discussion about different teaching approaches because previous discussions of best practice tended to focus on teachers' personal preferences. Working in a boys only school made the focus on gender particularly relevant.

What did the research say about gender and mathematics?

The head of department sourced a range of research from Cambridge University's library, by cross-referencing an Ofsted review of research and looking at a range of government statistical publications. He found evidence that:

- girls outperform boys in mathematics up to the beginning of A-Level, but that differences are small, and are not consistent across all aspects of the subject
- attitudes to mathematics vary by gender
- boys and girls have quite different expectations regarding their own performance in mathematics - boys tend to perceive topics to be less difficult than their success rate would warrant
- boys and girls differ in their typical learning styles - boys tend to exhibit holistic tendencies (look for connections and similarities within an overall big picture context of their learning) whilst serialists prefer to accumulate new knowledge in sequenced chunks and with set procedures and methods for problem solving, and
- ability grouping impacts differently on boys and girls - the requirement to work at the fast pace of a top set is a source of real anxiety for many students, particularly girls.

How did teachers feel boys' and girls' approaches to learning mathematics compared?

Before making the research findings known, the head of department asked his colleagues to comment on boys' and girls' relative attainment, pupil attitudes and expectations, different approaches to learning by gender and how pupil grouping might impact on boys and girls. He found that his colleagues' judgements about gender differences in learning mathematics were based solely on classroom experience, and that their intuitive judgements, though often broadly correct, tended to exaggerate the extent of any real differences.

How did discussing research findings change the teachers' approaches?

The head of department presented his colleagues with a written report comprising a commentary from the interviews and the principal findings from his literature review and used it as a focus for discussion in the department. He invited his colleagues to discuss the implications of the gender differences for their own teaching and to comment on how these variations were apparent in their classrooms. Together, they discussed a number of modifications to their lesson preparation and delivery, including:

- a recognition that grouping pupils by ability (measured in examination performance) did not create sets with uniform learning needs. For example, whilst some 'top set' students thrive with a full theoretical approach to new topics, others need 'step by step' practical examples
- an understanding that, since boys typically over-estimate their understanding of and performance with mathematical topics, teachers need to be appropriately cautious about advancing to a new subject, based solely on pupils self-reporting their own satisfaction with their learning
- an awareness of how to manage introductions to lessons, given that some pupils (typically boys) need the 'big picture' provided by lesson objectives, whereas other pupils (typically girls) want sequenced instructions one at a time.

Reference

Bevan, R. (2004) *Gender and mathematics: what can research tell us about how we teach mathematics to boys and girls?* National Teacher Research Panel conference summary.

NTRP: publications

Raising boys' motivatoin and achievement in textiles

We chose this case study because it is an example of how a group of teachers in a secondary school experimented with alternative approaches to delivering design and technology in order to improve the behaviour and effort of boys at Key Stage 3.

Teachers in the department had noticed a decline in the achievement of boys in design and technology and there seemed to be a connection between their attitude to the subject and their level of effort, which was most marked in food and textiles. There was a problem of poor behaviour among boys, for example mistreating equipment and resources and calling out. The teacher researcher was concerned about stigma and gender notions attached to technology and was keen to improve attitudes to learning the subject.

What approaches did the teachers experiment with?

Staff in the technology department first considered alternative class arrangements which they felt could have had a positive effect on boys' achievement, for example:

- pupils keeping the same teacher throughout the year and following the teacher to different material areas. But they felt that this would only have been possible with a few groups because not all staff were able to teach all areas of the curriculum
- single gender classes
- splitting pupils into ability groups to enable lower ability pupils to be put in smaller classes together with support teachers.

The teachers opted for single sex classes because they already had some experience of this at Key Stage 4. GCSE classes were often single gender classes, with girls opting for textiles and boys opting for resistant materials. The teachers also decided to look at different methods of teaching and learning that might help combat the apathy and gender stereotyping within the subject. One of the approaches they tried was lots of short, focused tasks, such as 'SCAMPER'. In this activity pupils looked at how to develop their design ideas quickly by using different prompts such as combining two aspects of the design, modifying a part of it, or substituting one aspect for another. This was effective as it was short and snappy and kept them focused.

Another approach the teachers tried was 'four by four by four' activities, in which pupils produced a page of different designs in a very short amount of time. The pupils then had to fold the page into four sections vertically and then four sections horizontally. This gave them a page with sixteen squares. They had to write their name on the back and then had four minutes to sketch their first design, eg. for a hat. The paper was then passed round the room. The teacher gave out different instructions each time, such as, 'design a hat influenced by the sea or morph two designs into one'.

The teachers also bought new equipment - sharp scissors, colouring pencils and fine liner pens - to improve the quality and presentation of the pupils' work, and a digital camera to take photos of finished work.

What did the pupils think of the new approaches?

A survey of all of the pupils in Year 9 on their views of their experiences within technology lessons over the year showed that:

- 90% of the boys had enjoyed technology

- 83% of the boys preferred their single gender classes to the mixed classes in the previous year
- 62% of boys felt that there was an improvement in classroom behaviour, and
- 54% felt that the teacher treated them differently.

Staff too felt better about the classes. As behaviour had improved, staff felt they no longer had to deal with some of the silly issues that occurred previously between boys and girls. In particular, the teacher researcher felt that her relationship with her boys had improved - she felt much calmer when dealing with a possible explosive situation. The boys were aware of the changes the teachers had made and appreciated them greatly, as this comment shows:

'They make more jokes and Miss is more relaxed and less stressy!'

Reference

Postlethwaite, J. (2006) *Boys will be boys? Raising boys' motivation and achievement in Key Stage 3 Design Technology*. National Teacher Research Panel conference summary.
NTRP: publicationsBack to top

Further reading

Where might teachers find related research?

Open Creativity: Recent and completed projects
http://opencreativity.open.ac.uk/recent.htm
Includes research on creative science teaching.

Iterative Best Evidence Synthesis (BES)
http://www.educationcounts.govt.nz/publications/series/2515
A best evidence synthesis of impact of students' outcomes.

The Research Informed Practice Site: CPD
http://www.standards.dfes.gov.uk/research/themes/cpd/?digest=all
A number of digests of studies on the theme of CPD are available.

Back to top

Appraisal

Robustness

This review is the fourth in a series of systematic reviews of teacher continuing professional development (CPD) and it arose directly from the findings of the first three. The review was designed to report on what specialists in CPD did that was effective in improving learning and teaching. The reviewers followed the detailed procedures for systematic reviewing developed by the EPPI Centre. They used a systematic search strategy and clearly defined inclusion/exclusion criteria to find and screen studies. The studies were keyworded to produce a map of the literature and then assessed for their quality and relevance using transparent and consistent criteria by two reviewers working in parallel. The results of individual studies which met the criteria were then synthesised to answer the review question. The review was quality assured and peer reviewed by the EPPI Centre.

The reviewers screened over 3000 titles and abstracts, from which they identified 239 studies reporting the

impact and processes of CPD which involved specialists. Scrutiny of the full reports led to a final sample of 22 studies for in-depth review. All these studies contained both teacher and pupil impact data. Nineteen studies with overall medium or high weight of evidence were used to create a synthesis of findings.

Improvements in learning and achievement were reported in relation to improved knowledge of scientific concepts and problem solving, mathematical and literacy skills, reasoning and problem-solving skills, engagement with classroom activities and increased use of ICT. Affective changes among pupils were also noted in several studies.

All the specialists used a CPD model which combined new inputs of knowledge with an extensive programme of support for teachers as they worked together to make changes to their classroom practice. They supported teachers through modelling, workshops, observation, feedback, coaching and planned and informal meetings for discussion. As well as introducing the teachers to new knowledge and learning content, the specialists provided support sessions, in which the focus was on helping teachers to make practical changes in their classrooms and evaluate their efforts.

Specialists met frequently with teachers. All the studies reported regular meetings or scheduled workshops for group discussions and debriefings. Most studies included at least some activities during school hours and nearly all the specialist support took place on school premises. More than half the CPD involved the specialists in observing teachers and providing feedback and/or debriefing. Most specialists facilitated and encouraged substantial collaboration between the teachers.

Applicability

A number of implications for schools arise from the review findings. These include a need to consider ways of:

- identifying teacher's professional learning needs as well as their CPD skills
- identifying staff expertise (content and pedagogical knowledge) which schools can draw on and equipping CPD co-ordinators with the means of judging the quality of that expertise
- helping specialist colleagues to develop a range of professional development skills
- developing leadership skills in making judgements about engaging and deploying specialists (either internal or external) in CPD programmes
- leaders putting the resources in place (designated time, or supply for example) to enable professional learning activities such as peer observation and joint planning to take place
- encouraging teachers to interpret new knowledge or skills through modelling, observation and feedback, and through experimenting with new or innovative practices.

Relevance

Currently, there is increasing interest in school-based CPD, but it is sometimes perceived as an alternative, rather than a complementary, approach to specialist support. It is important that schools understand the skills and contributions of external specialists to effective CPD more deeply and that they explore how their contribution connects with that of in-school support.

Writing

The review distils findings from a great many studies and makes the implications for practitioners, policy makers and researchers clear. The writing is accessible although sometimes lost in extensive technical detail which is a requirement by EPPI for such reviews.

Back to top