DEVELOPING GREAT TEACHING

Lessons from the international reviews into effective professional development

TEACHER DEVELOPMENT TRUST

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INTRODUCTION

The 2014 DfE consultation on A *world-class teaching profession* stated that "Feedback from the profession has consistently indicated that too many of the development opportunities on offer are of variable quality".[1] "Too often 'CPD' is viewed narrowly as attending courses or listening to stale talks accompanied by endless slides... Teacher development is not always adequately focussed on the specific needs of pupils, nor is it always sustained and practice-based."[2] "There is currently too little robust evidence on the impact of different types of professional development for teachers."[3]

These comments on the quality of CPD in England broadly chime with the findings from the OECD TALIS 2013 survey, which states that teachers here report higher than average participation in courses and workshops (75%) and in-service training in outside organizations (22%), but lower than average participation in more in-depth activities, such as research or formal qualifications – and less time spent overall.

It was in this context that the government announced its intention in 2015 to support the creation of an independent College of Teaching, as well as to offer a new fund "which will support high quality, evidence-based professional development programmes, led by the Teaching Schools network and rigorously evaluated for impact."[4] It also proposed a new 'What Works Clearinghouse'-style online platform for knowledge sharing and new non-mandatory standards for teachers' professional development.

This paper draws on the emerging findings from the ongoing umbrella review of evidence on effective professional development for teachers being undertaken by CUREE, UCL IOE and Durham University to indicate implications for future policy around teacher professional development and learning (CPDL).

METHODOLOGY

Our approach was to carry out an "Umbrella" review, i.e. a review of reviews of the evidence about effective CPDL in order to inform current, high profile policy reviews taking place in England; in particular we sought to link previous reviews to new standards for the rigour of evidence (such as the What Works Clearinghouse evidence tests) and to explore whether newer reviews cast light upon or refine previous evidence.

This type of approach is a common one in the medical world, and is used to provide a rapid overview of the existing evidence base. It does have weaknesses – for example, it can miss the most recent evidence published because it is dependent on studies published prior to the reviews involved, which themselves take time to complete. However, it is valuable both for identifying gaps in the evidence, and providing a reliable "birds-eye view" of the status quo. This means that the review can, with help from sector voices, identify important questions to pursue in subsequent analysis of the individual studies underpinning these reviews. As with all reviews, there is a balance that must be reached between speed and a more systematic approach. In the case of this review, given the urgency of the commission, the decision was to prioritise a systematic approach wherever possible, without compromising speed of completion.

The review began with a high-level search for reviews. The process by which this was conducted can be thought of as one of "connoisseurial accumulation", augmented by a broader search of the literature via FirstSearch, JSTOR, Google Scholar, and other similar aggregators of academic literature. By "connoisseurial accumulation", we mean using experts in the field to highlight known and relevant and valuable reviews. The search strings applied were recorded, and involved a fairly open set of criteria to capture the most relevant and valuable evidence. The searches were looking for reviews of CPD and teacher learning published since 2000, showing evidence of impact on learner outcomes, and in English (though a Belgian extension of Timperley was also found and analysed).

A total of 947 "hits" were identified based on our criteria. Of these, 115 were identified for screening, and 46 went through the screening process. The documents in the final selection

[1] Department for Education, A world-class teaching profession: Government consultation, 2014, p4
[2] ibid., p10 / [3] ibid., p10 / [4] ibid., p10

were classified at four different levels of strength/validity. One review was consistently strong in multiple areas, with research designs which were appropriate for causal inference across studies. A further three were found which were robust, but more specifically focused and thus offered slightly weaker evidence for our purposes even though they came from designs appropriate for causal inference. Another four were less robust in terms of supporting evidence (showing only correlational and not causal connections), but were tightly focussed on our questions, explored pre and post test data systematically and so were still considered persuasive. Finally, one further review was included which was sufficiently plausible to be included due to consistency with the available evidence, but which did not directly support its claims with high quality data.

The reviews were then analysed separately, on the basis of the evidence cited for each claim. Their claims were broken down and compared and contrasted with each other, weighting them according to the strength/consistency of their evidence base and agreement with other relevant review evidence. The claims were grouped thematically for different categories, which will be explored subsequently in this report. The strongest review, Timperley et al. (2007), was the only fully consistent and rigorous review, and this was used as a cornerstone for the umbrella review. Its claims were analysed both by theme and by subject then tested against other robust and persuasive claims to identify the overall weight of evidence for a claim to illustrate it, and to identify any gaps which other reviews might illuminate. The effect of this process is that the most rigorous claims featured in this umbrella review are equivalent in strength to medium to large for positive effects in the nomenclature used by What Works Clearinghouse, or the four padlocks used in the Sutton Trust-EEF Toolkit.

DESIGN OF A CPDL PROGRAMME

The umbrella review identifies and then explores what the evidence from the reviews indicated about CPDL programme design and what was necessary for it to be successful. The first headline finding was that carefully designed/aligned teacher CPDL with a strong focus on pupil outcomes has a significant impact on student achievement. Other related findings about the design features and contexts which need to be incorporated into CPDL for it to be successful are described below.

HOW LONG SHOULD THE PROGRAMME LAST?

Prolonged or extended CPDL interventions were found, more or less universally, to be more effective than shorter ones. Most reported programmes lasted at least 2 terms, more commonly a year, and in some instances even multiple years. At the same time, some reviews also found that narrowly focussed CPDL of moderate duration (e.g one day in total) can have a considerable and lasting impact on teaching & learning within, for example, narrowly specified aspects of teaching literacy (e.g. spelling) or of elementary science (e.g. use of enquiry methods).

Overall, the clear indication is that to be most effective CPDL programmes which aim to bring about significant organisational and cultural change need to last at least 2 terms. Sustaining CPDL over a period of time and ensuring that it features multiple, iterative activities following the initial input, were identified as extremely important across all reviews. According to the best review, small amounts of repetition were only sufficient to change practice positively in very specific and narrowly-defined practices, while one-off events did not had a positive impact.

Nonetheless, Timperley's analysis, the most rigorous, robust and large scale in the sample, also revealed that studies with poorer outcomes also featured extended time and frequent contact. The crucial factor differentiating more from less successful programmes is what the time was used for.

HOW MUCH FOLLOW-UP AND CONSOLIDATION IS NEEDED TO BRING ABOUT POSITIVE CHANGE?

The nature of follow-up, consolidation and support activities means that there can be no "one size fits all" answer to this question. What was clear was that all studies showed it was important

that CPDL programme design creates a "rhythm" to activities, through multiple instances of ongoing support/follow-up activities. The specific frequency of activities/support required for successful outcomes varied, particularly with regard to the nature and extent of expected change in practice/beliefs. Where the aim was to trigger substantive changes in teachers' understanding of approaches and/or their subject and how it is taught – for example, in relation to reading or writing – the highest-impact review reported a fortnightly to monthly rhythm of CPDL sessions/support. In addition, teachers must develop a grasp of the rationale underpinning a strategy that is being explored through CPDL, and use that understanding to refine practices and support implementation; thus creating a practical theory for the teaching and learning activities involved.

DESIGNING FOR PARTICIPANTS' NEEDS: WHAT DOES AND DOESN'T MATTER?

While individual participants will, of course, have specific needs which raise challenges for trainers, there are more general principles surrounding their needs which affect how successful CPDL content should be designed. All the reviews found that an essential element of successful CPDL is overt relevance of content to its participants and their day-to-day experiences and aspirations for pupils. This was highlighted by the strongest review to be particularly important for secondary, cross-curricular CPDL. All the reviews noted that recognition of differences between individual teachers and their starting points, providing opportunities for them to surface their beliefs, and providing opportunities for them to engage in peer learning and support, were all also crucial to bringing about improved outcomes.

VOLUNTEERS OR CONSCRIPTS?

The strongest review found that achieving a shared sense of purpose during CPDL is an important factor for success. What is interesting to observe is that, according to all the reviews that were part of this umbrella review, whether teachers were obliged to participate or volunteered to be involved mattered less than a number of other factors. A positive professional learning environment, the provision of sufficient time, and consistency between the professional learning experience and the wider social and educational context were all more significant than whether or not teachers volunteered to participate. Combined with the point above that a shared sense of purpose is important, this suggests that CPDL providers should be focusing on how best to ensure that course content can build a sense of purpose, rather than presuming that it will already be there. Many reviews, including the strongest one, highlight several ways of building this shared sense of purpose, including building in peer support, using evidence from experimenting with new approaches about how pupils are responding, and working on why things work as well as what does and does not work in different contexts.

WHAT WERE PARTICIPANTS IN SUCCESSFUL PROFESSIONAL DEVELOPMENT LEARNING?

The question of whether subject knowledge or general pedagogic knowledge is more important to the teaching profession is one that has been occupying educators and CPD experts for some time. The findings of this umbrella review have thrown some light on the problem. All the reviews found that pedagogy and subject knowledge were equally important; the strongest single review went further to state that CPDL focussed on generic pedagogic strategies is insufficient, particularly in maths, and that it is important to consider several alternative pedagogies for specific pupils too. Therefore, programmes focussed on just questioning skills or assessment for learning that are not also rooted in developing content knowledge to underpin such strategies and exploring how they work for different groups of pupils are not likely to achieve their potential.

There are a number of key "building blocks" which underpin effective CPDL according to the reviews. In addition to subject (1) and pedagogic knowledge (2), the reviews emphasise the importance of clarity around learner progression, starting points and next steps (3). CPDL content

should include a focus on formative assessment so that teachers can see the impact of their learning and work on their pupils. The strongest review also highlighted the importance of CPDL content and activities dedicated to helping teachers understand how pupils learn in general as well as in terms of specific subject areas (4) - and to grasp the relationships between all these building blocks. In short the review highlights the contribution of formative assessment, learning processes and outcomes for teachers within effective CPDL programmes.

The reviews collectively made a number of other points regarding content of effective CPDL. They identified as important consideration of the participants' existing theories, beliefs and practice, an understanding of the rationale underpinning the practices being advocated, and content which can challenge existing theories in a non-threatening way. Many reviews stressed the importance of explicit work on applying the new practices being promoted to different contexts. The strongest review noted two other elements in addition to these. The first is the importance of critical engagement from teachers with content. The second is the importance of CPDL providers creating room for professional discretion and repeated opportunities to encounter, understand, respond to and reflect on new approaches and related practices.

WHAT ABOUT THE PROVIDERS OF CPDL?

Obviously providers and facilitators of effective CPDL have a significant impact on the outcomes of their own course content. This review of reviews casts some light on who they are and how they work. But it is important to note first that in many cases the studies behind the reviews were carried out by research teams whose members were also involved in the intervention and the CPDL support. Almost all reviews found that external input is a common factor in successful outcomes, sometimes in tandem with internal specialists. The strongest review observed that in the most successful CPDL, external input includes providing multiple and diverse perspectives, and challenging orthodoxies; a point reinforced by the other reviews. All reviews found that successful external facilitators acted as coaches and/or mentors. A few, more narrowly focussed, reviews also found that successful CPDL facilitators were experts in more than one area, and their expertise included specialist content knowledge and in-depth knowledge of effective professional development processes, and evaluation and monitoring. These reviews also found that successful facilitators encouraged and/or helped teachers take on a degree of leadership of CPDL, and, according to the strongest review, treated them as peers and co-learners. This relationship enabled successful facilitators to share values, understanding, goals and beliefs with participants, but also to challenge them successfully.

HOW CAN SPECIALISTS EFFECTIVELY SUPPORT PROFESSIONAL DEVELOPMENT?

A consistent message across all the reviews was that outside expertise was crucial in bringing about substantial improvements to pupil outcomes. Looking through the reviews, a consistent pattern in the contribution of external contributions emerges that encompasses:

- Making the public knowledge base, theory and evidence on pedagogy, subject knowledge, and strategies accessible to participants.
- Introducing new knowledge and skills to participants.
- Helping teachers (particularly those from schools where achievement is depressed over time) believe better outcomes are possible (according to the strongest study).
- Making links between professional learning and pupil learning explicit through discussion of pupil progression and analysis of assessment data.
- Taking account of different teachers' starting points and (from the strongest review) the emotional content of the learning.

Another consistent message across all the reviews was that in the most effective CPDL, specialists supported teachers by modelling, providing observation and feedback, and coaching. However, the strongest study also looked into differences across subjects, and found that the picture was more complicated in CPDL for maths and science. In science, there was some evidence that teachers in the successful programmes did not have opportunities to be observed and receive feedback, and in maths observation and feedback were linked with both more and less successful programmes, but in more successful programmes feedback was consistent with other conditions. Another finding consistent across multiple studies was that facilitators and specialists had to balance support and challenge while building relationships with participants. Finally, the less-strong reviews found that effective specialists mobilised, encouraged and guided teacher peer support, and also offered remote support in a variety of forums such as e-networking and provision of instructional and other materials.

HOW CAN PROVIDERS DESIGN CPDL TO ENCOURAGE EFFECTIVE COLLABORATION?

While collaboration is now generally considered integral to all professional development, creating an environment where that collaboration is genuinely contributing to improvements in practice and outcomes remains elusive. The only common finding across all reviews was that peer support was a common feature in effective CPDL, with all participants having an opportunity to work together to try out and refine new approaches. The strongest review found that collaboration was necessary, but not sufficient, and was linked to both positive and negative outcomes. The links were complex: where collaboration was the only focus, learning was limited. What the study did find was that access to some form of collegial support for solving important problems was essential, along with input from an expert leader, establishing common goals and new approaches for achieving them, and with joint effort focussed on learning of pupils with similar needs.

The less-strong studies provide illustrations of the forms that collaboration took including peer or co-coaching, shared planning, peer observation and collaborative action research. They also found that structured collaboration was linked to positive effects for students.

WHAT ACTIVITIES DID PARTICIPANTS ENGAGE IN?

All reviews noted certain activities, or types of activities, which featured in successful CPDL strategies. All the studies noted that explicit discussions about how to translate CPD content to the classroom took place following initial input. The reviews were also all consistent in noting that teachers in the successful courses implemented what they had learned by experimenting in the classroom. In all the reviews, teachers in successful CPDL engaged in analysis of and reflection on underpinning rationale, evidence and assessment data, and this reflection and analysis was important for bringing about and embedding change in practice. This was done in a variety of ways, such as through discussion and combining multiple approaches. Fostering a meta-cognitive approach among teachers was also consistently recognised as valuable for both bringing about change and sustaining learning. Less-strong studies also noted the use of journals and fostering meta-cognitive awareness as contributing to these processes.

The strongest review made a number of observations regarding activities involved in successful CPDL. According to this review the design of successful professional development programmes is aligned with the pedagogic processes being promoted and the ways in which the professional learning is structured. Such programmes also included mechanisms during activities out of schools that helped teachers translate the new practice into their own classroom contexts. Where secondary participants were required to apply learning about generic pedagogy to their subjects, specialist facilitators provided individualised support, usually in the form of one-to-one planning, observation, and feedback sessions. Some of the less-strong studies also noted, relevant to the previous point, that participants engaging in this process had support from in-school coaches and/or mentors.

THE IMPORTANCE OF ALIGNMENT IN CPDL ACTIVITIES & PROCESSES

The strongest review made an observation, which was not shared across other reviews but which nevertheless made some powerful suggestions about how CPDL providers should conceptualise their course content. The review noted that, while it is necessary to have a variety of activities to reinforce messages and test things through different lenses, no single particular form of activity was shown to be universally effective. What mattered was a combination of a logical thread between the various components of CPDL, and the provision of opportunities for teacher learning which are consistent with the principles of student learning being promoted. No particular configurations were crucial to success, but aligning goals, activities, experiments in classrooms, engagement with evidence and underpinning rationale does matter alongside multiple perspectives and angles.

WHAT DOESN'T WORK?

All the reviews involved in this meta-analysis offered a number of clear statements about forms of CPDL that do NOT lead to positive outcomes for participants or students. A didactic model in which facilitators simply tell teachers what to do, or give them materials without giving them opportunities to develop skills and inquire into their impact on pupil learning is not effective. Neither is professional development which does not have a strong focus on aspirations for students and assessing the impact of changed teacher practices on pupil learning. Where professional learners are not given structured, frequent opportunities to engage with, understand and reflect on the implications of new approaches and practices, neither extended time nor greater frequency of contact were sufficient to make substantial changes to teacher practice or improve student outcomes.

SUBJECT ANALYSIS

One of the features of the strongest study featured in the umbrella review was a more detailed examination of the content of CPDL by subject. Some of the new reviews were also subject specific and, like Timperley, focussed in particular on maths and science and, to a lesser degree, literacy. Exploring similarities and differences in patterns for these three subjects reveals some intriguing patterns and distinctions. The first thing that emerged was that there were a number of things which were broadly true for all subjects:

- External expertise: all interventions in the review made use of external expertise. The review found that its use was necessary, though not sufficient on its own, for successful outcomes.
- School leadership: the study found that successful CPDL occurred where school leaders created conditions which allowed it to flourish (though the emphasis on leadership was lower in maths than in other areas).
- Professional learning goals: professional learning goals were explicit, clear to everyone, and specifically related to achievements in the subject in focus.
- Theory: the study found that developing an understanding of the underpinning rationale or practical theory is pivotal.
- Teacher activities: teachers needed variety, and the ability to explore approaches from multiple angles. No single activity was universally effective.
- Consolidation of prior knowledge: consolidating prior knowledge was not clearly or explicitly reported in subject specific reviews although it did sometimes emerge in more generic reviews.
- New information: careful introduction of new information was part of all the professional learning opportunities featured in the study.

There were also some significant differences between subjects. When the various claims were arranged by subject on a Venn diagram, several patterns emerged. The first was that mathematics

and literacy did not overlap at all- they only shared characteristics where subject was irrelevant. Science and literacy overlapped as did Science and maths. Science and literacy overlapped with each other slightly more than science and maths did, but not to a very significant degree. Science and literacy in particular seemed to share characteristics regarding context, and activities participants were involved in. Science and maths also had several things in common with reference to the context of CPDL, but facilitator contributions were distinctive in these subjects.

Alignment between the content of the CPDL and what is being promoted by subject associations and policy makers matters much less in Literacy / English than Mathematics and science. In Mathematics and science the focus on assessment during CPDL is closely linked with the development of deeper understanding of content. In English/ literacy it features more as a generic CPDL driver eg via Identifying PD needs; as a catalyst for engagement; to test effectiveness of practices for specific students; diagnostically to focus teaching. In science CPDL there is a strong emphasis on providing and exploring explicit curriculum delivery materials than in English and, to some extent in Mathematics. In Science and mathematics CPDL underpinning theories and principles tend to be more explicitly taught early on. In English/ literacy they tend to emerge later on and deductively, from exploring different students' responses to strategies and content. Collaboration emerges more as a design feature in Science and mathematics CPDL. It features less as a design feature and more as an n outcome in English/ literacy based CPDL.

HOW DO SCHOOL LEADERS EFFECTIVELY SUPPORT PROFESSIONAL DEVELOPMENT?

We specifically excluded studies of the leadership of CPDL from our searches because of time and resource constraints and because of the understandable scarcity of leadership studies that provide pupil impact data. Nonetheless, several reviews did include some evidence about leadership and this was true of the strongest review. We have therefore provided a summary of the evidence about leadership of CPDL that we surfaced to contextualise other findings. We would not though want to suggest that this is in any way a definitive of complete summery of evidence about the leadership of CPDL.

The strongest study in the umbrella review explored an array of roles and functions that school leaders perform in effective CPDL, particularly in those instances when learning and its impact is sustained over time.

The review concludes that '*effective leaders did not leave the learning to their teachers—they became involved themselves*'. The degree of leaders' personal involvement in CPDL differed but was present in some form in most programmes associated with teachers' making substantial changes to their practice. It ranged from understanding the precise nature of expected changes to practice and creating organisational conditions for these to happen through to hands-on personal involvement in CPD opportunities delivered by e.g. external specialists. Effective CPD programmes focused on literacy in particular frequently comprised specific training for school leaders. Evidence highlighted that one of the core functions of leaders supporting literacy-specific CPD and development work in their schools was to analyse pupil assessment data and ensure and oversee its use in learning and development.

Evidence about leaders' involvement in professional learning and development differed by subject area. It was strongest for generic pedagogy-focussed and literacy-focused CPD. It was weaker for maths and science-specific CPD.

From the analysis of the studies with substantive and sustained positive outcomes for pupils as well as teachers, the strongest study in the umbrella review identified four core roles for school leaders, which were adapted according to the school context and the nature of changes being implemented.

Developing vision involved a number of aspects, including: developing an 'alternative reality' for student outcomes (ie helping teachers believe that alternative outcomes were possible, particularly in schools with a history of low levels of pupil attainment and progress), an alternative vision of ways to think about curriculum content and how to teach it (particularly in maths and science), and creating coherence so that teachers understood the relevance of their CPD to wider priorities. .

A managing and organising role included establishing priorities, resolving competing demands, sourcing appropriate expertise and ensuring appropriate opportunities to learn (including funding and time) are in place. Another aspect of this role was to do with engaging of teachers reluctant to take part or sceptical about the selected approach. Whilst little direct evidence was available about how best to engage such teachers, possibilities highlighted in the studies included ensuring clarity of purpose behind the initiative, choice of appropriate and effective forms of and content for professional development, and viewing teachers' theories as worthy of debate and testing in terms of outcomes for different students and their groups.

The *Leading professional* learning role comprised promoting a challenging learning culture, including through personal involvement in CPDL, knowing what content and learning activities were likely to be of benefit and promoting 'evidence-informed, self-regulated learning'. Key to ensuring sustained impact from CPDL over time leaders promote such activities as core business, so that teachers continuously monitor the impact of their work on student outcomes and examine the implications of such monitoring for their future teaching.

Finally the *Developing the leadership* of others role involved encouraging teachers to lead a particular aspect of pedagogy or of the curriculum in particular. This was present in several successful interventions. But it is also important to note that when a cascade model was used to achieve sustainability (i.e. when teacher leaders were trained by experts and then asked to train others) there was little evidence of this being effective. For example, some teachers felt uncomfortable about taking on the role of 'expert', challenging others and giving feedback. In other studies, teacher leaders who volunteered lacked relevant expertise.

IMPLICATIONS OF THE EVIDENCE FOR CONTINUING PROFESSIONAL DEVELOPMENT AND LEARNING FOR POLICY MAKERS

The DfE consultation on A world-class teaching profession (2014) set out the significant challenges facing individual schools and policy makers if England's schools are to utilise world-class CPDL as a mechanism to improve the quality of teaching in every classroom. There is an urgency to this challenge: it will be important to ensure that the proposed long-term solution of establishing a Royal College of Teaching or that the current focus on school autonomy does not prevent a sufficient focus on improving the quality and impact of CPDL in the short to medium term, since this will be key to improving the quality of teaching and, therefore, learning outcomes.

In presenting the implications for policy makers in England's highly autonomous, 'self-improving' school system, there is an important caveat: the evidence base is not particularly well aligned with the current focus on school led improvement, simply because very few rigorous studies examine school-led CPDL. Rigorous evaluations have tended to focus on formal programmes that are designed and delivered by external bodies, rather than by schools themselves. Therefore there is a need to consider how the existing evidence might inform further action in a school-led system.

Nevertheless, the evidence does provide substantial pointers to the processes that matter wherever and however CPDL is led. It can therefore ensure that the new professional development standards and the design of funded programmes are research informed. Equally, the proposed approach to evaluating the Teaching School-led programmes could plug an important gap in the evidence base, although there will be methodological challenges in doing this in rigorous ways.

We see the specific issue for policy makers and practitioners to consider as they shape an approach to evidence-informed professional development in a school-led self-improving system as follows:

a: While individual schools will remain accountable for their own improvement and Teaching Schools will play a lead role in shaping Initial and Continuing Professional Development, it will be important to consider where and how **appropriate external expertise** can be brought in to this equation.

b: Given the importance of most CPDL being sustained over two terms to a year, and the TALIS finding that teachers in England are less likely to engage in such sustained

programmes and spend less time on CPDL overall, it will be important to consider **how schools and alliances can be incentivised to provide the sustained resources and commitment required for effective CPDL**. It is important to emphasise here that time on its own is not the answer – quality is just as important.

c: The skills and knowledge required by **facilitators of CPDL** are particularly key – whether these are internal or external to schools - so there is a need to consider how these might be developed in a more effective way.

d: Meta-reviews by John Hattie and the Education Endowment Foundation have helpfully brought together evidence on generic pedagogy in recent years. Meanwhile, the capacity and reach of many subject associations has reduced due to the straightened financial climate. The findings from this review indicate **the importance of focussing on generic and subject specific pedagogy**, so it will be important to consider how subject expertise in particular can be developed alongside more generic aspects as part of CPDL.

e: While **peer support and learning** is a fundamental ingredient of effective CPDL, it is not sufficient in its own right. The recent focus on Joint Practice Development in schools could lead to overly introverted models that recycle existing practice if teachers are not also given structured and facilitated opportunities to engage with new evidence, theory and practice.

f: Although this review has not looked in depth at the literature about **evidence-informed practice and knowledge mobilisation**, a number of findings do emphasise the importance of the use of evidence; both evidence from pupils' responses to teachers' developing understanding and practices and to the importance of the strength of the evidence and rationale underpinning the CPDL. Studies of knowledge mobilisation and use of research are likely to have an important additional contribution to make and it is important that policy makers, researchers and designers of CPDL continue to investigate these links.

IMPLICATIONS OF THE EVIDENCE FOR CONTINUING PROFESSIONAL DEVELOPMENT AND LEARNING FOR PRACTITIONERS

From a school leader and practitioner perspective the CPDL landscape has changed radically over the last 5 years. Gone are the large scale, generally free, national CPD programmes that were offered by national agencies such as the National Strategies, the General Teaching Council, the Qualifications and Curriculum Development Agency. Gone too are the national, web based banks of CPD resources and, for the most part, any sense of government prescription or signposting of resources. In their stead leaders and teachers are invited to make their own plans and choices supported, wherever possible, by school based colleagues in Teaching School Alliances, academy chains and networks based on shared interests, such as the Challenge Partnerships, or on University centres of excellence, such as the long standing SUPER network run from the University of Cambridge.

Teaching School Alliances in particular have a direct responsibility for supporting CPD and for promoting research and development as part of professional renewal, even if these are experienced as two rather less well funded or promoted areas of responsibility when compared to the funds and incentives around Initial teacher education through School Direct or school to school support for schools that are struggling.

The system is thus much less centrally informed, supported and driven and CPD and CPDL practices are correspondingly more variable. In this context the concerns of the DFE about "variable quality" in the current CPD offer seem likely to be shared by practitioners. No doubt the "planned fund to support high quality, evidence based professional development programmes" will be helpful in addressing the concerns of both practitioners and policy makers.

But in the meantime the evidence in this report suggests a number of things that schools and teachers can do on the ground. It points, for example, to the importance of school leaders:

- Distinguishing sharply between:

- CPD aimed at operational and procedural knowledge (e.g. how teachers use fire extinguished or comply with legislation or MIS systems) where simple briefings and group discussion may suffice; and
- professional learning directly aimed at building on teachers' starting points to significantly enhance pupil learning - where the sustained and dynamically interacting mix of activities highlighted by this evidence will be required.

- Setting explicit and high expectations of pupil learning oriented CPD providers and facilitators – whether they are colleagues in school, from other schools, from HEIs, from professional networks, private providers or examination boards, through, for example:
  - discussing specific expectations about potential impact with participating teachers prior to participation
  - interrogating providers (including internal ones) prior to signing up for/ agreeing to CPD programmes about how they;
    - support identification of teachers' and school leaders' starting points so that programme activities can build incrementally upon participants' prior knowledge, skills and experience.
    - use content-specific formative assessment as a CPD goal, a learning process, a means of ensuring the CPD programme is having the desired impact and as a learning outcome.
    - build planning time for planning change "back at the ranch" into away-from-class or school activities.
    - embed collaborative learning and the development of shared understanding and goals within the professional learning process.
    - ensure programme providers either have of have access to in-depth expertise in the programme goals in relation to teaching and learning and the curriculum content and in relation to the professional learning process - and have ensured all three are aligned.
    - ensure programmes provide tools to help teachers and leaders engage critically with evidence about how pupils respond to changes they are making in their day to day work settings.

The evidence also points to steps schools and teachers can take to ensure that, given the inevitable logistical constraints, there are structured arrangement in school to follow up learning from CPD programmes through sustained and iterative experimenting with and refining new approaches in the light of learning with and through pupils' responses. In effect this evidence highlights the importance of school leaders planning, developing and monitoring the effectiveness of the school as a professional learning environment through, for example, ensuring that:

- Collaboration in support of professional learning is not only encouraged but also *structured and disciplined* through engaging with evidence from both pupils' responses to changes in practices and from research.
- Performance review discussions are rooted in qualitative as well as *quantitative evidence* about how teacher learning and pupil learning are interacting and focus as much on why learning is progressing and or encountering obstacles as what is happening.
- In addition to developing creative ways of disaggregating INSET days to create a *rhythm for CPDL*, regular school meeting times such as departmental and phase meetings are used as opportunities for following up and tracking learning from CPD sessions.
- Teachers have access to *tools for collecting and analysing qualitative evidence* about

how changes are working on the ground alongside outcomes data through, for example, structured peer observation, use of video, collaborative action research, collaborative work scrutinies and/or structured research lesson study, so that formative evaluation of whether CPD and CPDL are working can be evidence informed.

- CPD sessions in school *model explicitly the quality and depth of planning* for schemes of work that leaders are expecting teachers to create for their pupils and make these connections explicit.
- CPD opportunities related to pedagogy is accompanied *by time for teachers to contextualise this for specific subjects and groups of pupils*.
- Concerns about giving time for CPD and CPDL are addressed by *wrapping structured and explicit professional learning protocols and activities around work to meet other priorities* and also used to build CPD capacity.
- The school and teachers *seek out challenge in relation to CPD* through either:
  - externally enabled professional learning experiences where the status quo can be accurately and safely calibrated against models of excellence elsewhere; or
  - establishing systems within the school that collect objective evidence about the status quo in ways that help colleagues can challenge it freely and on an informed basis in the context of evidenced best practice in other settings.

IMPLICATIONS FOR FURTHER RESEARCH

Any review of reviews inevitably generates rather abstract findings. This review was envisaged as the first phase of a two stage process. In particular the umbrella review was intended to identify issues where newly emerging evidence and changes in practice in England point to a need for further, systematic exploration of the evidence in the individual studies highlighted by the different reviews. The review authors have identified the following as important areas for practice and policy where it seems likely the individual studies behind the review can add texture and detail to the robust and high level findings from, the Umbrella Review during a second, follow up study:

- There is a need to identify in more detail the processes that are key to ensuring that conscripts as well as volunteers develop ownership of CPDL and are successful in using new practices to enhance pupil achievement.
- There would be real benefit in identifying specifically what it is that external specialists contribute to effective CPD and CPDL and the implications of that for the growing numbers of internal CPDL facilitators.
- It would be helpful to clarify the circumstances in which it is important to help teachers challenge and refine their beliefs and assumptions about teaching, learning and the curriculum through CPDL, how and why this works and matters and the role of developing an underpinning rationale or practical theory within this process.
- In the context of a high stakes assessment system it would be very helpful to identify in greater detail the ways in which the central and multi layered role of evaluating pupils' progress formatively acts as a goal, an input, a learning process, a way of evidencing teacher progress and an outcome of CPDL.
- In the context of widespread but relatively unstructured collaboration, it would be helpful to tease out the distinctive characteristics of effective peer support and the dependencies between that and in-depth specialist support.
- The similarities and differences between effective CDPL in relation to mathematics, English and science as highlighted at headline level by this review are intriguing and potentially very important to practice, especially given the strong finding that pedagogic CPD alone is not effective. It is important to unpack these similarities and differences as revealed by the best studies encompassed by the most rigorous reviews.

APPENDICES: METHODOLOGY

APPENDIX 1: TEACHER DEVELOPMENT TRUST: LITERATURE SEARCH RECORD

DATABASE	SEARCH STRING	HITS	INCLUDED FOR FULL TEXT SCREENING
FirstSearch	(ti=review or meta-analysis) and (ti="professional learning" or ti="professional development) and (ti=teaching OR ti=teachers OR ti=teacher) and yr: 2000-2014	**0**	**0**
	kw: review and ((kw: professional and kw: development)) and kw: teacher and yr: 2000-2014.	**15**	**1**
	kw: review and ((kw: professional or kw: development)) and kw: teacher and yr: 2000-2014	**80**	**15**
	kw: meta-analysis and ((kw: professional and kw: development)) and kw: teacher and yr: 2000-2014	**1**	**0**
	kw: professional and kw: development and kw: review and kw: teach* and yr: 2000-2015	**51**	**2**
JSTOR	((ti:review OR ti:meta-analysis) AND (ti:professional) AND ((ti:development) OR ti:learning) AND (ti:teacher OR ti:teachers))	**7**	**0**
	(((ab:(teachers')) AND ab:(professional)) AND ab:((learning OR development)))	**581**	**52**
	ab:teachers' AND ab:professional AND ab:(learning OR development) AND (ti:review OR tb:review)	**4**	**1**
	kw: review and ((kw: professional and kw: development)) and kw: teacher and yr: 2000-2014	**15**	**1**
	kw: meta-analysis and ((kw: professional and kw: development)) and kw: teacher and yr: 2000-2014.	**1**	**0**
Google Scholar	allintitle: teacher professional development review OR meta-analysis OR synthesis OR systematic	**68**	**28**
	allintitle: teacher professional learning review OR meta-analysis OR synthesis OR systematic	**18**	**1**
	allintitle: continuing professional development review CPD OR teaching OR teacher OR teachers OR systematic OR meta-analysis OR narrative	**17**	**2**
	You searched for: TOPIC: (teacher professional development review) Refined by: RESEARCH DOMAINS: (SOCIAL SCIENCES) AND RESEARCH AREAS: (EDUCATION EDUCATIONAL RESEARCH) AND TOPIC: (impact) Timespan: 2000-2014.Search language=Auto	**89**	**12**
		947	**115**
	Duplicates removed		**69**
	Included		**46**

APPENDIX 2: INCLUSION CRITERIA

INCLUSION CRITERIA

Language:	English only
Timescale:	Since 2000
Type of paper:	Must be a review (article, report, conference paper, chapter, book)
Population:	Professional educators of school age children (4-18) in working in formal learning settings
Schools:	Public and private. Only mainstream. i.e. Just 'teachers' not headteachers/ principals (exclude leadership training); not TAs or paraprofessionals – need to be clear about Early Years staff distinctions)
Only qualified, not ITE:	CPD: Must be about CPD Outcome: Must be a review of effects/ outcomes Exclude reviews of models of CPD.

APPENDIX 3: METHODOLOGY

FIGURE 1: APPROACH

INITIAL FILTERING

Nine hundred and eighty reviews were found, 33 of which came from expert recommendations and 947 reviews from electronic searching described in appendix 1. Of these, 115 met the inclusion criteria (in Appendix 2) so were included for screening. Eighty one were excluded on the grounds of relevance of type of review, this included 46 studies from the review process. Thirty four full reports were screened and were allocated a level from one to three:

- Level 1: Methodology and weighting of evidence clear
- Level 2: Methodology clear but no weighting of evidence
- Level 3: Methodology unclear

Eight reviews were classified as level one, 10 as level two, and 15 as level three. Only those classed as level one or two were carried over to the next stage to look at in more detail. When the full studies were looked through for each of the 18 level one and two studies, seven of these were removed from the analysis as they were not relevant to the umbrella review and a further two were not included as they were part of a series of linked reviews. Nine reviews were then explored in more depth to identify the claims they made about effective CPDL.

CLAIMS ANALYSIS

Claims analysis tables were completed for each of the nine reviews, and were verified by others in the research team to ensure validity. For this analysis, each of the claims cited within a review- i.e. the features of CPDL that had been found to be effective- were noted in a table. Additionally, the researchers noted down the following:

- Model of change.
- Evidence – detailing the type and number of studies included within the review, and details on the inclusion criteria and weighting of the evidence where relevant.
- Analysis – the review itself was analysed for the rigour of its approach, and comments were made in regards to this.
- Applicability/actionability – the applicability of the findings were noted.

Each review was then 'graded' on a five point scale, depending on the rigour of the review. The gradings given were (from strongest to weakest):

- Consistent and rigorous: Extensive consistent evidence from rigorous studies (extensive= more than 5 studies at scale, i.e. 30+ teachers; consistent= effect size within 0.2 SD).
- Robust: Claim follows from findings and is based on evidence from one or more well-controlled trials or other method appropriate for causal claims (RCT, well-matched experiment, regression discontinuity, etc).
- Persuasive: Claims consistent with evidence (e.g. from correlational studies) or where evidence of impact is indirect (e.g. teacher behaviours rather than impact on learners).
- Plausible: Claims derived from pre and post test evidence that aligned with review questions.
- No warrant/unfounded: Claims without an evidence base; opinions

An example of this process can be seen overleaf.

Overall the following levels were given:

- 1 consistent and rigorous
- 3 robust
- 4 persuasive
- 1 persuasive

STUDY	CLAIM – ALTERNATIVE VERSION	EVIDENCE	MODEL OF CHANGE	ANALYSIS	APPLICABILITY / ACTIONABILITY	CONCLUSIONS
Timperley et al. 2007	**CONTEXT** Initial circumstances Neither who initiated the professional development nor whether it was voluntary or compulsory was associated with particular outcomes for students. **Time** Length of time appeared to be less important than frequency of contact, but most of the studies concerned interventions lasting 6 months or more. A shorter time was sufficient for professional learning involving a narrow domain, such as spelling. Where the professional development was intensive (for example, daily during a summer institute), a shorter period was required. **Expertise/leadership** All the interventions in the core studies made use of external expertise & most included an element of leadership training or involvement.	The 13 core studies & groups of studies that met the authors' criteria for methodology & outcomes for students were primarily from New Zealand & the US, with 1 large study from the UK & a smaller study from Canada. A number of related studies that provided further information about the core studies were also consulted. 11 studies that did not meet the methodological &/or outcomes criteria are listed as supplementary studies; all were from New Zealand & the US. 10 of the core studies had a reading emphasis (with half also measuring writing achievement), whilst 3 had a writing emphasis.	The demands of literacy teaching & learning are complex & challenging. Thus, whenever approaches to literacy teaching are the subject of professional development, substantial change is required of Ts. But Ts' craft knowledge, together with their experience as professionals and the discourses in which they engage formally & informally, shapes Ts' theories about literacy & how it should be taught. So the challenge for CPD/L providers is not just to provide Ts with new & more effective ways of teaching, but also to help them think differently about their students.	**+backing** Rigorous inclusion criteria of studies, including assessing the methodology of the studies High number of effect sizes analysed & listed – though note that 'the very high average effects for literacy/language skills are strongly influenced by the high effect sizes for student populations with special learning needs, for example, those participating in reading recovery, which typically included measures of both reading & writing.' Studies filtered for robust pre-post comparison **-counter claim** Only 1 core study looked at professional learning in a secondary school context Handling studies with low achievement claims?	Contextual relevance may be limited, since only 1 large study is from UK (Earl et al. 2003) & the student achievement gains were relatively small. Note also that the biggest group of studies that met the selection criteria had as their target students whose learning needs were not being met by current practice & who were achieving at levels below those of their peers. There is sufficient detail under key headings of context, content, activities, etc., to allow inferences to be drawn.	**ROBUST**

CLAIMS CONSTITUENTS

Once the claims analysis had been completed, each of the claims were analysed against a grid to determine what overarching categories they belonged to. The research team went through each of the claims in turn and highlighted which category or subcategory the claim belonged to. Where necessary, researchers added in extra subcategories. An example of a completed claims constituents table can be seen below.

STUDY	CLAIM	FOCUS/AIMS/ NEED	PEOPLE	PROCESS	CONTENT/ EVIDENCE ('STUFF')	WEIGHT OF EVIDENCE
VAN DRIEL	PD of moderate duration (24 h) can have a considerable and lasting impact on teaching and learning in elementary science. Furthermore, this effective PD approach contained science content situated in activities and scenarios involving student curricula and instruction, in combination with analysis of student work and classroom pedagogical practice. The authors conclude that policymakers should invest in PD that emphasises analysis of student learning, pedagogy and content, rather than focusing on general pedagogy or exclusively on science content.	External to School Policy Curriculum change Standards Innovation NGO e.g. subject association HEI/ research Internal to school	Who Facilitators/ Providers Participants For participants Phase Subject Interaction With facilitators (only) With peers	Classroom/ teaching context (in vivo) Out of 'live' context ('in vitro') e.g. Summer School, After school Timing/ pacing Duration Frequency Intensity Rhythm (iteration) Pedagogical approach Mirrored (i.e. same as advocated for use) Experiential Problem solving/ Enquiry Knowledge acquisition (lecture, reading)	Knowledge of theory Curriculum subject content knowledge/ skills/ understanding (K-S-U) Teaching approaches (K-S-U) From own teaching/ learning context e.g. Video, work scruting Research evidence STUDENT LEARNING	**RIGOROUS**

Once this had been completed for all nine reviews, all the claims for each overarching category (focus, people etc) were pulled together, in tables as below. The processes theme was split into claims specifically regarding time and duration, and other processes.

STUDY	CLAIM	SUBJECT	LEVEL
Blank et al (2009)	Programme designs with ES with significant ES included a strong emphasis on teachers learning specific subject content as well as pedagogic content.	Science, maths	Rigorous
Capps et al (2012)	Less than half of the programs reviewed (7 of 17) required teachers to develop inquiry-based lessons related to the program objectives. One program expected teachers to bring in problematic lessons and adapt them to be more consistent with inquiry. This explicit approach helped teachers learn how to develop their own inquiry lessons and allowed them to collaborate with colleagues and with professional developers. Additionally, the fact that these lessons were already part of the teachers' curriculum made this process relevant. Although many teachers can teach inquiry-based lessons that have been created by professional developers, it is more difficult to develop one's own inquiry-based lesson. Teachers will likely benefit from PD experiences grounded in the same pedagogical principles they will later enact in their own classrooms suggested the need to be explicit about inquiry. Explicitly supporting teachers in learning how to develop inquiry-based lessons may help sustain inquiry-based teaching beyond the enactment of a specific program's curriculum.	Science	Persuasive
Capps et al (2012)	15 out of 17 programs reviewed actively supported teachers in discussing how they might transfer PD materials or experiences into their classrooms. Explicit discussion about how one will enact workshop materials or transfer experiences in the classroom is an essential feature of inquiry PD. Contextual factors are important, and the reality is that there is no classroom environment or teacher that is identical. Allowing workshop time for teachers to discuss these differences with colleagues and professional developers will more likely ensure that teachers will feel comfortable enacting the reformed-based curriculum in their classrooms. Additionally, discussions on transference allow teachers to consider how enactment may look in their classroom.	Science	Persuasive
EPPI 4	Specialists introduced the theoretical and practical knowledge base.	Generic	Persuasive
Timperley	The interventions documented in the core studies all shared a focus that was specific to mathematics, clearly articulated goals to teachers that related specifically to student outcomes in mathematics, and provided teachers with a range of mathematics-based content. Attempts to improve student achievement through implementation of a pedagogy that lacked a mathematics focus were not successful in improving mathematics outcomes for students (p91)	Maths	Robust

Themes were then identified within each of the categories, and relevant claims were grouped together within these. The claims from studies that were robust or rigorous were analysed first. Each category's claims were analysed by at least two members of the research team to ensure inter-rater reliability.

SUBJECT ANALYSIS

As Timperley (2007) was the only fully consistent and rigorous review, the claims were also analysed by subject (literacy, maths and science). All claims made for each of the three subjects were pulled together and displayed side by side so the similarities and differences could be identified, to identify if features of effective CPDL were consistent across all three subjects or subject-specific. This can be seen below.

As shown below, themes were identified within the claims, such as peer support, and were highlighted accordingly. Where 'xx' was marked, this meant that there no claims were made within this theme.

Following on from this analysis, subject-specific claims from other reviews were cross-referenced to see whether they supported the claims made by Timperley or not, and to identify any other claims that were made.

Finally we worked with the TDT to convene a seminar to test out emerging findings with interested practitioners and policy makers and to work with them to identify conclusions.

MATHS	SCIENCE	LITERACY
Infrastructure Supports ■ Supports such as funding and time allocations for teachers to work with one another or a provider were associated both with core studies and those with low or not impact **Coherence with policy** ■ All of the interventions in the core studies offered programmes of professional learning that focussed on deepening content knowledge and that was aligned with directions advocated by policy makers or influential bodies such as national subject associations **Voluntary or compulsory** ■ Volunteering was associated both with core studies and those that had low or no impact. *A commitment to engage did not need to be a prior condition; what was more important was that teachers engaged with the learning process at some stage.* **Individual or whole-school** ■ Professional learning involving all teachers from a school, department, or year level was associated both with core studies and those that had low or no impact. Some form of collegial *support was evident in all studies documenting significant shifts in practice. Collegial support involved colleagues and/or providers.*	**Infrastructure Supports** ■ The core studies provided too little information about infrastructural supports such as funding or release time for any conclusions to be drawn. **Coherence with policy** ■ The interventions in all the core studies promoted approaches to science teaching that were consistent with both current research findings and with their policy contexts **Voluntary or compulsory** ■ Volunteering was not a necessary condition for successful professional development, neither was it a guarantee of change. ■ The content and form of the professional learning opportunities were more important than volunteering in achieving teacher 'buy-in'. **Individual or whole-school** ■ A similar proportion of studies involved teachers participating in professional development independently of their school colleagues, and teachers participating as part of a whole science department or school. *Core studies in which teachers participated independently of their school colleagues developed collegial groups among participants.*	**Infrastructure Supports** ■ Most interventions provided some form of infrastructure support, such as release from class. ■ The inputs of experts (researchers and/or providers) was funded in all interventions, typically from an external source. **Initial circumstances** ■ Neither who initiated the professional development nor whether it was voluntary or compulsory was associated with particular outcomes for students. **Coherence with policy** ■ xx **Voluntary or compulsory** ■ xx **Individual or whole-school** ■ xx

■ Infrastructure ■ Coherence with policy ■ Voluntary or compulsory ■ Peer Support ■ PLC

APPENDIX 4: STUDIES USED

1. Avalos, B. (2011) Teacher professional development in Teaching and Teacher Education over ten years. *Teaching and Teacher Education 27, 10-20*
2. Blank, R.K. & de las Alas, N. (2009) *Effects of Teacher Professional Development on Gains in Student Achievement. How Meta Analysis Provides Scientific Evidence Useful to Education Leaders*. Washington: Council of Chief State School Officers
3. Capps, D.K., Crawford, B.A., & Constas, M.A. (2012) A Review of Empirical Literature on Inquiry Professional Development: Alignment with Best Practices and a Critique of the Findings. *Journal of Science Teacher Education 23*, 291-318
4. Cordingley, P. (2051) A world-class teaching profession – Response to the DfE Consultation. [Online] http://www.curee.co.uk/files/publication/[site-timestamp]/A_World_Class_Teaching_Profession_Feb_2015-publish.pdf
5. Cordingley, P., Bell, M., Isham, C., Evans, D. & Firth, A. (2007) What do specialists do in CPD programmes for which there is evidence of positive outcomes for pupils and teachers? Report. London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London. [Online] http://eppi.ioe.ac.uk/cms/Default.aspx?tabid=2275
6. Cordingley, P., Bell, M., Rundell, B. & Evans, D. (2003) The impact of collaborative CPD on classroom teaching and learning. London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London. [Online] http://eppi.ioe.ac.uk/cms/Default.aspx?tabid=133&language=en-US
7. Teaching And Learning International Survey (2013). [Online] http://www.oecd.org/edu/school/talis.htm
8. Timperley, H., Wilson, A., Barrar, H. & Fung, I. (2007) *Teacher professional learning and development. Best evidence synthesis iteration (BES)*. Wellington, New Zealand: Ministry of Education
9. Van Driel, J.H., Meirink, J.A., van Veen, K. & Zwart, R.C. (2012) Current trends and missing links in studies on teacher professional development in science education: a review of design features and quality of research. *Studies in Science Education 48*, (2) 129-160
10. Vescio, V., Ross, D. & Adams, A. (2008) A review of research on the impact of professional learning communities on teaching practice and student learning. *Teaching and Teacher Education* 24, 80-91
11. Yoon, K.S., Duncan, T., Lee, S.W-Y., Scarloss, B. & Shapley, K. (2007) *Reviewing the evidence on how teacher professional development affects student achievement [Issues & Answers Report, REL 2007-No. 033]*. Washington, DC: U.S. Department of Education, Institute of Educational Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Southwest.