TEACHER CPD

International trends, opportunities and challenges

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Supported by a grant
from Nord Anglia Education

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Foreword

I am delighted to introduce this visionary project by the Chartered College of Teaching bringing together, as it does, some of the best thinkers in the field of professional learning, along with case studies of how to bring it about in practice.

Nord Anglia Education has been very pleased to support the development of this publication as it mirrors entirely our own philosophy, that professional learning is only as good as the impact that it has on teachers and ultimately students in our classrooms, laboratories, playing fields and studios. This is an area that several of the pieces explore in much more detail, and which I will commend to all my colleagues.

In nearly 30 years in UK state teaching and school leadership, and now six years in the international sector, I have been privileged to discover some universal principles that underpin great professional learning, and these are reflected exceptionally well in all these pages. It is at its best when it is part of a virtuous cycle that encompasses performance review and development (let's hope we can quickly lose the, in my opinion, outdated concept of performance 'management'), feedback, identification of learning goals and true involvement of our colleagues in identifying their own needs. The philosophy espoused in this publication is that of professional learning conversations, mentoring, coaching and guidance, without losing any of the rigour that is an essential part of maintaining the highest standards of professional practice.

When I was a headteacher in a UK state comprehensive, not that long ago, the greatest compliment I ever received was when a colleague reflected that together we had created a true learning organisation, where every member of our community actively sought out opportunities for personal and professional development and received the right level of support. It has always saddened me when I see schools (and have of course faced the same temptations myself) seeking to balance budgets by shaving their professional development allocations – we all know that it is short-sighted to do so and of course we are all aware of the pressures. However, reading these pages has inspired me once again to maintain our organisation's consistent and unflinching commitment to providing the best experience possible for every colleague, be they teaching staff or part of our wider team.

I hope it will equally challenge and inspire all those who read the various articles, reviews, research reports and case studies and I look forward to developing this most important of conversations more and more deeply in the future.

Andy Puttock, Group Education Director, Nord Anglia Education, UK

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Introduction from the editors

When we first developed the idea for this publication, we envisaged a short report, comprising a small number of articles highlighting some key research and practice in teacher CPD from around the globe. And yet, as we began to identify topics and themes and to seek contributions, we found that the quality and variety of approaches and thinking that is happening in teacher professional development internationally deserved more – leading to a collection of over 30 articles, case studies and summaries that we hope showcases some of the trends, opportunities and challenges in developing and enacting powerful professional learning for teachers. Within these pages, some of the world's leading researchers and practitioners share their own perspectives, projects and reflections around teacher CPD, and we see some of these principles in action through case studies from a range of different schools and settings.

We know the impact that high-quality teaching has on the learning of children and young people (Sutton Trust, 2011), and we know, too, the impact that professional development can have on teacher effectiveness (Cordingley et al., 2015). The publication starts, therefore, with a section exploring how (and indeed *if)* it might be possible or desirable to assess teacher effectiveness. From CJ Rauch and Rob Coe's exploration of possible approaches to measurement to Lawrence Ingvarson's articulation of the importance of teacher certification, this section underpins all of the articles that follow, recognising as it does that the effectiveness of professional learning itself is predicated on its impact on practitioners, and, ultimately, pupil outcomes.

Of course, no matter how well-designed and implemented, teacher CPD is only likely to bear fruits in an environment and culture where it is prioritised by leadership (Department for Education, 2016) and where teachers feel supported to take action based on their learning. The second section therefore moves to the wider topic of professional culture, how this can be developed, and the role it plays in supporting teacher development. Matthew Kraft and John Papay outline the features of schools where teachers continue to become more effective over time, Emily Perry and colleagues look more widely at notions of teacher professionalism, and we see case studies from Hong Kong, New Zealand, Australia and England.

Building on these key ideas, the third section reflects on what we know about effective professional learning (and what we don't!). Whilst many of the principles and arguments presented will be familiar – for example, the importance of a strong evidence base for CPD content and the need for collaboration and expert challenge (Cordingley et al., 2015) – what stands out from the articles in this section is how much more complex than that developing powerful teacher CPD really is. As both David Weston and Carol Campbell highlight in their articles in this section, there is no simple 'recipe' for teacher learning. Steve Higgins' notion of the 'Bananarama principle' applies equally here as for any other education intervention: 'it's not what you do, it's the way that you do it'; or, as Professor Stuart Kime would argue, it's

both what you do *and* the way that you do it. Integrating opportunities for collaboration in professional learning, for example, won't necessarily mean that it is effective – it also depends on the nature of that collaboration.

The next two sections focus in on more detail of some promising approaches that build on the features of effective CPD. In a series of articles, Becky Allen, Ben Riley and Frances Langdon and colleagues explore principles around coaching, mentoring and deliberate practice, while Philippa Cordingley argues for the value of collaborative engagement with and in research, and case studies from David Berliner and Dylan Wiliam exemplify what this might look like in practice.

Across the whole publication, a number of challenges and barriers to teachers accessing CPD are identified. We know that time and cost can be significant barriers (Department for Education, 2016), but the importance of subject-specific CPD and the challenges in delivering it also raises its head time and again. But the numerous challenges identified in developing effective professional learning seem counterbalanced by evidence of what does work and of the opportunities described in these pages; in a number of articles, but particularly in the final section, there are reflections on how innovative approaches, including those making use of technology, may be able to support scaling of projects, increase access and facilitate collaboration not just for those engaging in professional learning, but for those designing it too. Amongst others, Anna Riggall looks at examples of technology to support CPD around the world, and Gemma Jackson considers the potential of social media as a more informal learning tool.

As well as a large number of brand new articles, we include in this publication some of the most interesting and significant case studies from previous publications and research studies, lending wider insight. We know, of course, that there are many areas that we have not yet included – but we look forward to updating this publication over time with further case studies that reflect the richness and variety of practice around the world.

Throughout the publication, we connect what we are doing at the Chartered College of Teaching to the emerging themes. Supporting teachers to engage in CPD that really makes a difference is at the heart of our work; building a culture where career-long professional learning is not just an entitlement, but an expectation that requires teachers, school leaders, researchers, CPD providers and policymakers to work together to create a culture shift – and there is a huge opportunity to collaborate not just within country borders, but across them, too.

We hope you enjoy reading the publication as much as we have enjoyed producing it, and that you find it leaves you with an optimistic outlook, questions and inspiration – whether you are seeking to identify the kinds of CPD that might best support your own practice, or are yourself responsible for supporting or leading the development of other teachers.

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Measuring teaching quality: How, why and for whom?

01

Evaluating and measuring teaching quality

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The quality of teaching is arguably the single most important thing that teachers and school leaders can focus on to make a difference in children's learning. The difference between really good teaching and less effective teaching makes more difference to learning than any other factor within school. High-quality teaching narrows the advantage gap. Crucially, it is also something that can be changed: all teachers can learn to be better (Wiliam, 2016).

It is no secret that society demands teachers of the highest quality. Firstly, there is an inherent belief that every child should have the right to a free, appropriate education; naturally this requires quality teachers. Additionally, of all the factors that influence student achievement, teacher quality is one of the few that education systems have direct control over. Therefore, educational systems invest heavily, both in time and resources, in continuing professional development (CPD). Naturally, then, these systems are very interested in assessing the quality of teaching. While such evaluations can be used to inform CPD, in practice they are also sometimes considered for hiring, firing, and promotion.

Such an evaluation comes with inherent difficulty, in the same way that assessing students' knowledge poses a challenge. Indeed, many parallels can be drawn between teacher learning and evaluation and student learning and assessment. In the same way that a range of assessment types can be used to gather evidence of students' mastery, so too is there a range of methods to evaluate teaching. Goe, Bell and Little (2008) identify seven major methods: classroom observations, 'value-added' models, student ratings, headteacher/principal judgements, self-reports, classroom artefact analysis, and teacher portfolios.

Coe et al. (2014) reviewed the literature on these methods in the report: "What makes great teaching?" The report identified challenges and opportunities for each method, and explored significant findings stemming from each method. This article discusses some of the challenges faced in employing these methods, as well as the process of evaluation in general. Fortunately, these methods also offer opportunities and potential; these are also explored. Finally, the article concludes by considering the implications for CPD, based on these challenges and opportunities.

Challenges in evaluating teaching

The seven aforementioned methods of evaluating teachers come with inherent challenges. These challenges are not cause to abandon measuring effectiveness. Instead, they are discussed here to serve as caveats; these methods can still serve a purpose and, when used appropriately, still provide meaningful data. Recognising these challenges is an essential first step in more effectively evaluating teaching.

The first challenge is one of validity. To what extent do the methods employed capture what they purport to capture? A valid conclusion is one that has been reached through rigorous methods; it is reliable in that it can be repeated in different contexts with the same results, and it is accurate in that these results represent the truth. Research has identified that three of the methods of evaluating teaching offer only moderate validity for indicating effective teaching; these are classroom observations, 'value-added' models, and student ratings. Other methods, such as teacher self-reports, analysis of classroom artefacts and portfolios, may offer some insight but their correlations with other measures and reliability are often found to be low (Coe et al., 2014). Therefore, careful consideration must be given before placing too much credence in the findings from a given method. Validity can never be assumed.

Even the most valid methods on the surface still rely on the decisions underpinning them. Often, the nature of these questions is political – that is, questions of power, authority, and reinforcement of who is in control. For example, in examining peer observations, Goldberg et al. (2010) argued that these were effective when the observed teacher has control over the feedback for their own use. Otherwise, teachers are often reluctant to participate in a meaningful way (McMahon, Barrett and O'Neill, 2007; Chamberlain, D'Artrey and Rowe, 2011). Similar findings hold true for headteacher or principal evaluations (Coe et al., 2014). Power structures affect not only the operations of a school but have implications for evaluating teaching.

However, decisions need not be about power to have profound effects on the outcomes. For example, there is little agreement on specific practices for implementing value-added models as a way of measuring effectiveness (Coe et al., 2014). Decisions about which assessment or outcome measures are used can have profound effects on the final results. Further decisions must be made regarding whether to calculate an overall 'school effect' (e.g. to reflect overall school leadership, culture, and student characteristics) or to leave it out. Hill et al. (2011) examined the decisions of U.S. school districts and found a range of schools were making decisions either way. The study further compared four different value-added models with the same set of teachers. If a teacher were judged by the model in which they scored their best, two-thirds would be in the top half of the ranking at least once. This further demonstrates how the decision-making process can lead to a wide range of results.

An additional challenge lies in the effective implementation of these approaches. While many of them are theoretically feasible and widely accepted, the practical implementation can vary considerably. Teachers, heads of subjects, headteachers, and principals must be adequately trained, which can come with significant costs to time or money. Even then, effective adoption requires buy-in from participants. These unavoidable human factors can have adverse effects on the reliability of any measure of effectiveness. This is perhaps best witnessed through school leader and headteacher or principal observations. Without adequate training and effective standard-based observation instruments, principals are not particularly reliable or suited for teacher assessment (Coe et al., 2014). Even then, there remains a degree of difficulty in controlling for human elements. For example, a study of teachers in Belgium found that those who exhibited active supervision, charisma and strong content knowledge were perceived to be effective (Tuytens and Devos, 2011). While these are not necessarily bad traits, nor do they necessarily equate with effective teaching per se, careful training and preparation, regardless of the method, is required to ensure faithful implementation.

Related to effective implementation of approaches is the consideration of effective interpretations of data. This can be particularly true with a method like student ratings; while much of the research has been situated in higher education, the approach has

also been applied in primary and secondary schools (Coe et al., 2014). The research suggests that students' responses should be interpreted in consideration of their age and perspectives; young students in particular may conflate personality traits with effectiveness (Burniske and Meibaum, 2012). Given inconclusive and conflicting prior research on gender bias in student evaluations, Boring (2017) explored the issue in a French university. The results show a bias, with higher ratings for male teachers. Therefore, care must be taken in interpreting student evaluations.

A prevailing theme throughout these challenges is that careful consideration must be given. While these methods are not perfect, rarely are things in education perfect. That makes these challenges no less significant. However, evidence informed, context-specific, and purposeful considerations are the best response to these challenges.

Potential in evaluating teaching

The aforementioned challenges are by no means a reason to abandon the prospect of measuring effective teaching. While the usual methods do give pause, they also allow for great potential and promise. They can be employed but are best used with caution. In some ways, they can be a Pandora's Box of evaluating teaching – while they come with troubles, they also come with a gleam of potential.

In particular, it can be through triangulating evidence – that is, not relying on a sole method in isolation, but rather a multifaceted approach – that a clearer picture comes into focus. While convenient, a single unified measure of effectiveness may not provide an accurate representation. Instead, a range of data sources can provide a more nuanced image of teachers' strengths and weaknesses. Coe et al. (2014) have posited that there may even be 'threshold effects' for effective teaching – that is, a very successful strength in one component of effective teaching may offset a weakness. Teachers would not make claims on a student's learning based on a single isolated assessment. Instead, they build a nuanced picture from a variety of different sources. In the same way, a variety of sources of data can build a more complete and informative picture of teaching effectiveness.

Various frameworks exist that combine multiple aspects of teaching. And to align with the variety of aspects, multiple sources of data are used. This is true regardless of what a framework, a society, or a school values as essential core components of effective teaching. For example, the COACTIV study (Kunter et al., 2013) of German mathematics teaching defined teaching effectiveness through teachers' professional knowledge and values. Conversely, the CLASS conceptual framework (Pianta and Hamre, 2009) argues that assessing quality should be based on classroom interactions. Kime (2017) notes that regardless of the dimensions that make up the core teaching competencies, 'multiple measures' are required. Doing so builds a more complete, valid and reliable picture. This therefore offers significant potential in understanding teaching effectiveness.

In addition, when evaluations of teaching are treated as formative processes, rather than summative processes, there is greater potential for teacher learning. However, even when this is the intention, this is not always true in practice. A study in the United States found that formative mid-year evaluations were closely correlated to summative decisions with regard to dismissal and promotions (Master, 2014). This need not be the situation, as a study of school leaders in Texas found (O'Pry and Schumacher, 2012). When principals are knowledgeable, supportive of teachers, and guide them through thoughtful reflection, the experience was seen as positive and meaningful. Just as with students' assessment data, Campbell's Law applies; as the stakes for decision-making increase, so too does the process become more susceptible to corruption (Campbell, 1979). Therefore, the potential to improve teacher practice – and in turn, student outcomes is best achieved through a formative evaluation process.

These points offer potential for evaluating effective teaching. A formative, interconnected framework allows for teaching effectiveness to not only be evaluated but opens the door for it to be continually developed.

Implications and conclusions

Given the above challenges and potential, there are key take-aways that can inform educational practice. Not only do the advantages of the previous section stand as suggestions for the measurement of effectiveness, they also point to important steps in teachers' CPD.

When evaluation of teaching effectiveness is formative, rather than summative, it can provide opportunities for teachers to grow and develop their practice. For this to happen, the feedback they receive must be effective. Timperley et al. (2007) argue that feedback must be evidence-based and offer clear, achievable goals. Furthermore, feedback and instruction must be followed and supported by sustained practice and learning. Therefore, CPD should be seen not as a one-off event, but rather a continuous learning process. In turn, evaluation methods like conducting observations, calculating value added, and collecting student feedback together must be continuous, low-stakes, and informative.

This set of challenges and potential strengths adds additional weight to the arguments of effective CPD put forward by Timperley (2008). Namely, opportunities for professional learning must be sustained, collaborative, and supported by school leaders. Schools must value these opportunities to support and develop its teachers. Evaluations need not be the basis for summary employment decisions, but instead the foundation for an ethos of formative growth and improvement.

An education system that values improving student outcomes will therefore value improving teaching effectiveness. While not without challenge, there is potential to bring about these improvements.

Given how important it is, it may be surprising how little we really know about exactly what "great teaching" is, and perhaps even less about how to get more of it. Despite the intuitive conviction held by many teachers that "they know it when they see it," research suggests that this is not necessarily the case. What we judge as good practice is often at best loosely related to how much students are actually learning. Part of the problem is that to be effective, teachers need to have strategies and skills to solve a wide range of problems: great teaching is not a single, unidimensional thing. All great teachers, to paraphrase Tolstoy's famous opening to *Anna Karenina*, may be alike in the sense that they have mastered all the challenges. But regular teachers will differ greatly in the trade-offs and compensations they exhibit. And it isn't just about what teachers do, it's about the why, when and how, too. The exact same behaviours may be effective in one context and inappropriate in the next. Deciphering this puzzle is therefore the next great task remaining for those concerned in teachers' professional learning and effectiveness.

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The role of advanced teacher certification in promoting quality teaching and lifting the status of the teaching profession

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What is certification?

Certification refers to an endorsement by an independent professional body that a member of that profession has attained an advanced standard of professional practice. Familiar examples include Chartered Engineer, Chartered Accountant and Fellow of the Royal College of Surgeons. The main characteristics of professional certification are that it is:

- profession-wide and provided by an independent professional body
- voluntary and available to all members of that profession
- based on assessment of performance; it is not an academic qualification
- belongs to the person and is portable; it is not a job or position specific to a school or employer, though it may be a criterion for eligibility for promotion to one of these.

While advanced certification systems are common among many professions, they are rare in the teaching profession. In well-established professions, a professional certification system defines high-quality standards of practice, promotes development towards those standards and identifies those who reach them.

There are many accomplished teachers but, unlike other professions, teaching has been slow in developing its own system for providing recognition of their value. Professions are normally trusted to run their own certification systems. If convinced by its rigour, employing authorities usually encourage members of the profession to seek certification and reward its attainment through access to higher salary scales and eligibility for promotional positions.

A standards-based professional learning and certification system

The professional learning system in the teaching profession has been characterised by three main weaknesses:

- a lack of a consensus about what good teachers can get even better at over the long term from novice to expert
- a lack of incentives for evidence of professional development
- a lack of ownership and control by teachers over their own professional learning system.

As a result, traditional modes of professional learning have been weak instruments for promoting widespread use of evidence-based practices, lifting the quality of teaching and improving student learning outcomes (Elmore, 1996 and Timperley, 2007). These are weaknesses that a standards-based professional learning and certification system aims to rectify (Ingvarson, 1998; 2014).

The essential characteristics of such a system are:

01 *standards* for highly-accomplished teaching that describe what teachers need to know and be able to do to provide quality opportunities for students to learn and thereby give direction for professional development over the long term

02 rigorous methods for assessing whether teachers have attained those standards and providing professional *certification*

03 higher salary levels and career pathways that provide *recognition* for certification and substantial incentives for teachers to attain the standards

04 an infrastructure for *professional learning* that provides support for candidates to gain the knowledge and skill embodied in the standards.

Taken together, the four components form a system of interdependent and mutually supportive parts. Each has its own function and characteristics, but each is less effective without the others. If one is taken away, the system loses its capacity to function effectively as an instrument for encouraging and recognising evidence of professional learning (Ingvarson, 2014).

Certification and professional learning

Certification is the way most professions drive continual improvement in their members' practice, in their own, and in the public interest. Professions provide novices with high performance standards for which to aim over several years. They provide a rigorous and independent system for assessing when they have attained those standards. Successful candidates gain a respected certification that employers are willing to pay for, thus creating a strong market for their knowledge and expertise. They gain the esteem of having "made it" in their profession.

A certification system provides a means by which the profession can take responsibility for building its own professional learning system, linked to challenging teaching standards. A well-rewarded certification system provides incentives for all teachers to collaborate in attaining high standards, without divisive effects on staff relationships.

There is no shortage of knowledge about the characteristics of effective professional learning activities; activities that link professional learning to improved student-

learning outcomes (Hawley and Valli, 1999). Research indicates that the process of preparing evidence about their teaching practices for certification necessarily engages teachers in the most effective modes of professional learning. It places teachers in the *active* position of analysing their practice and being invited to show how they meet the standards in their school context.

Extensive research has been conducted on the effects of NBPTS certification on teachers and schools (NBPTS, 2007). A survey of 10,000 teachers who had been through the National Board certification process found that 92 percent reported that the process made them better teachers, with 89 percent having said it equipped them to create stronger curricula and better evaluate student learning. Nearly all said it was the best PD experience they had ever had.

Independent studies show that students of National Board Certified Teachers do better on standardised tests than students of non-NBCTs. When groups of teachers within the same school prepare together for certification it can make a significant improvement to student learning outcomes, particularly in disadvantaged schools (Gitomer, 2007).

Certification leads teachers to engage more in providing teacher leadership. Board certified teachers are also more effective at making standards-based judgments of practice and providing feedback to colleagues (Lustick, 2011). Teachers who gain certification are significantly more likely to remain in teaching. In the USA, certification is also redefining the nature of university masters courses that teachers routinely take for salary progression.

Establishing an effective advanced certification system: a shared responsibility

An advanced professional learning and certification system embodies the principle that governments and the teaching profession have a mutual responsibility for ensuring all students have quality opportunities to learn. They depend on each other to place a priority on quality teaching to make the system work.

While the profession provides the certification, governments and other employing authorities in collaboration with teacher unions must provide the recognition. If teachers want recognition for accomplished practice, they need to demonstrate that they can be trusted to set high standards and identify those who attain them. In return, Governments that are serious about building a world class teaching profession need to provide incentives for all teachers to attain those standards.

Placing greater value on high quality teaching is central to lifting the status of teaching and ensuring that sufficient numbers of most able students choose teaching as a career (OECD, 2011). Good teachers are worth their weight in gold, but if the profession wants greater value to be placed on high quality teaching, it has to demonstrate that it can evaluate it in ways that are valid and reliable.

To be effective and viable, a national professional body providing a certification must be independent from government, employing authorities and unions, but it must also work alongside and complement their responsibilities. It needs to offer a unique service; a service that governments, government agencies and unions find valuable, but cannot deliver themselves.

A government desiring a world class teaching profession must place a high priority on quality teachers and teaching, and ensure that a professional certification system is recognised and remunerated at levels that lead most teachers to participate.

Certification, remuneration and career pathways

It is important to note that a certification system is not about creating some kind of elite category of teachers. Rather, it is about providing a broad career pathway along which all teachers are encouraged to progress, with appropriate opportunities to advance their professional knowledge and practice.

International research indicates that one of the most productive investments that a country can make to improve its education system and promote learning gains for children living in poverty is to ensure that the attractiveness of teaching as a career in terms of salaries and status is comparable with other professions (Akiba, Ciu, Shimizu et al., 2012; Dolton and Marcenaro-Gutierrez, 2011; Mathis, 2016; OECD, 2015).

It also shows that it is not salaries for beginning teachers that distinguish countries with higher levels of student achievement. Rather, it is the *ratio of salaries of experienced teachers relative to GDP per capita* (Akiba et al., 2012). This ratio, and the ratio of teacher salaries to other occupations requiring similar tertiary qualifications, has a significant effect on the career choices of high quality university graduates (Chevalier, Dolton and McIntosh, 2007).

OECD reports show that for England, the ratio of teacher salaries at the top of the salary scale to those of beginning teachers is only 1.7; much smaller than that for other professions requiring comparable qualifications. Also, unlike most European countries, teacher salaries in England declined by 10 per cent over the period from 2005 to 2017.

These trends represent a serious threat to the quality of teachers being recruited and therefore the future quality of England's education system. Reversing these trends calls for policies that will enable teaching to compete successfully with other professions for academically successful graduates. It is hard to see how this can happen without a strong guarantee that higher salaries are clearly linked to convincing evidence of attaining high teaching standards.

A rigorous professional certification provides a basis for significantly increasing salaries for accomplished teachers beyond the top of the current incremental scale, thereby making teaching a more attractive career option for the most able graduates, and better able to retain its best practitioners.

Certification systems for teachers aim to build a closer alignment between increasing expertise and career progression. This approach to linking teacher pay to certification stands in stark contrast to that underlying quota-based merit pay schemes, typically limited to annual one-off bonus payments, which have largely proven to be ineffective and disruptive to school functioning. In contrast, the evidence indicates that a certification system supports collegiality and strengthens schools as professional learning communities.

International experience

Several countries have been introducing such systems and their success has varied according to the extent to which they have implemented all four components.

For example, the certification system developed by the National Board for Professional Teaching Standards (NBPTS) in the USA, established in 1989, is one of the most valid and reliable (National Research Council, 2008; Ingvarson and Hattie, 2008). Its independence is a critical factor in its longevity, as well as its rigour. By 2019, over 122,000 teachers had gained certification, in a process with demonstrable benefits to professional learning and retention rates. However, its reach has been limited due to the slow process of gaining recognition for Board Certified teachers from employing authorities and in industrial agreements across 50 states and 14,000 school districts.

Contrastingly, a recent Chartered Teacher scheme in Scotland got the recognition part of the system right, but not the rigour (Ford and McMahon, 2011). The scheme had strong buy-in from teacher unions, governments, and employing authorities, and all agreed to provide substantial incentives for teachers who gained certification (20% pay rise). However, the credibility of the assessment process for certification was not clearly established (Ingvarson, 2009) and as a consequence, the scheme was vulnerable and was discontinued (McCormac Review, 2011).

In Australia, the Australian Institute for Teaching and School Leadership (AITSL) has established a system for the certification of teachers at two levels; the Highly Accomplished Teacher and Lead Teacher levels (AITSL, 2012). However, so far the

number of teachers applying for certification each year is far too small to have an impact. Less than 600 have gained certification over the past four years.

While AITSL is responsible for developing the standards, the responsibility for conducting the assessment has been delegated to multiple jurisdictions at state and school system levels, rather than a single national certification authority for which the profession feels ownership. Unlike England, jurisdiction over the certification system was not delegated to the profession.

As a consequence, comparability in standards across jurisdictions has been difficult to ensure, undermining the portability of the certification between states and between school systems. Also, the process by which teachers are assessed is cumbersome, and so far certification is insufficiently rewarded in terms of salary and career pathways (Ingvarson, 2018).

In England, meanwhile, one of the core responsibilities of the recently-established Chartered College of Teaching has been to develop a Chartered Teacher Programme; a national system for providing certification to teachers who attained high standards of practice. 100 teachers completed the programme as part of the pilot cohort earlier this year. As the programme emerges, it has the potential to promote widespread use of successful practices, as well as lifting the status of the profession and its ability to attract high quality graduates and retain its best teachers.

These examples illustrate how governments, employing authorities, and the teaching profession must meet their respective responsibilities if a certification system is to succeed.

Conditions affecting the success of certification systems

What would constitute success of a certification system? One indicator might be that over a period of 20 years the proportion of certified teachers in the workforce steadily grows to something like 30 to 40 percent (Dinham, Ingvarson and Kleinhenz, 2008). In England, for example, which has about 500,000 teachers, this represents a steady state eventually of about 150,000 to 200,000 teachers with Chartered Teacher status; a highly desirable eventuality. However, this would mean that across England, the Programme would need to build the capacity to certify about 20,000 teachers per year. Ambitious, but not inconceivable with the support and networks the many teacher associations might provide.

Experience with professional certification systems indicates that their long-term success and viability depends on whether the processes used to assess candidates meet the following interrelated, APPLE criteria (Perlman, 2008).

Administratively viable: This basically concerns the manageability of the processes involved in gathering evidence about a teacher's practice, setting standards and training assessors to make unbiased, consistent judgments. Dangers lie in asking for too much evidence and not knowing precisely how each task will be judged before asking candidates to carry it out.

Publicly credible: This criterion is perhaps the most critical as it concerns the validity of the assessment process. Do the assessment tasks provide authentic evidence of accomplished teaching? Does the assessment process identify highly accomplished teachers and discriminate between teachers who meet the standard and those who, as yet, do not? Ongoing research into the validity of the assessment process will be necessary (Gitomer, 2008).

Professionally acceptable: This criterion concerns whether, on balance, teachers regard the costs, workload and processes involved in undertaking the certification process as fair and reasonable, and commensurate with the remuneration and career prospect benefits of gaining certification.

Legally defensible: Will a decision not to recommend certification to an applicant

stand up to scrutiny in a court of law? This will depend on convincing evidence that the assessment tasks are valid and reliable measures of accomplished teaching and that the assessment processes are transparent, unbiased and accountable.

Economically affordable: A certification system needs to be economically viable. The main costs involved in running a certification system arise from supporting candidates and conducting the assessments. An application fee needs to be set at a level that at least covers the cost of the certification process and is readily recoverable by teachers a few years after gaining certification. (The current application fee for NBPTS is $US1900).

What would we see if a standards-based certification system were working well?

If an advanced certification system in the teaching profession met these conditions and gained public and professional respect, the evidence suggests that it would provide a system:

- in which most teachers participate and which most teachers regard as a normal part of their professional career pathway
- that teachers regard as demanding, challenging and rigorous, but appropriate and worthwhile
- that provides clear direction for professional development over the long term - from novice to highly accomplished
- that engages most teachers in seeking the kind of professional learning that helps them attain accomplished professional standards
- that thereby promotes pervasive use of proven practices and improved student outcomes
- that governments and employing authorities regard as a valid indicator of highly accomplished practice and worth rewarding for its additional effects on recruitment and retention of good teachers
- where teaching could offer more attractive career options, able to recruit entrants mainly from the top 30 per cent of students in terms of academic achievement
- that leads teachers to undertake collegial initiatives with colleagues with direct benefits to students
- that is a valid criterion for promotion to school leadership positions
- that provides a means by which the teaching profession can exercise control over its own professional learning system
- that lifts retention rates, particularly in shortage subjects and attracts accomplished teachers from other school systems and jurisdictions
- that gives certified teachers a highly marketable professional qualification.

Conditions promoting the impact of professional certification systems on schools

To engage most teachers in advanced professional learning and to reap the full benefit of the certification process:

- research suggests that salary increases for gaining certification must be substantial (at least 20-25 per cent) if the scheme is to engage most teachers and attract greater numbers of high quality graduates to teaching (Ingvarson, 2018)
- certification should gradually become 'mainstreamed'; i.e. become a valued criterion for promotion to positions of teacher and school leadership, thus promoting instructional leadership and schools as strong, professional organisations
- interesting and influential new roles for certified teachers in teacher leadership need to be created and institutionalised in schools.

A professional certification system also has the capacity to promote equity across a nation's schools if staffing profiles of all schools were required to have similar proportions of certified teachers, and if school budgets enabled school leaders to compete on an equal footing in recruiting certified teachers. Parents might also find such indicators useful in assessing whether their children's schools were adequately resourced.

Final comment

There is a simple logic in advocating support for standards-based professional learning systems in the teaching profession. It is the quality of teachers that matters most in ensuring all students have quality opportunities to learn. It is accomplished teachers who play a major part in ensuring a country meets its educational objectives. However, true as these statements are, they must be matched by policies that prioritise the quality of teachers and foster leadership at the level of the profession, as well as the school. It follows that such policies should trust the profession with the responsibilities of a profession and support extensive engagement of teachers in professional certification programmes.

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CASE STUDY

The National Board Certification process as a school improvement strategy

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Given a growing body of research (for example, see Cavalluzzo et al., 2014; Cowan and Goldhaber, 2015; or Salvador and Baxter, 2010) that shows students taught by National Board Certified Teachers (NBCTs) perform better on outcome measures than those students who are not, we wondered if supporting groups of teachers in low-performing schools to pursue NB Certification would have positive effects on student learning and on school culture. That is, rather than look at the pursuit of certification as an individual competition, look at it as a collective professional development strategy. We particularly wanted to know if involving groups of teachers from the same school in the certification process would create a school effect – a change in the overall culture and learning climate of the school – and thereby help improve low-performing schools.

With these larger goals in mind, in 2013 we initiated a professional learning intervention to support cohorts of teachers within the same school to pursue National Board Certification together.

The National Board Certification process

Teachers who pursue NB Certification select a certification area from among 25 areas, such as maths, science, language arts, music, art, physical education, or exceptional needs. The certification process typically takes one to three years. At the time of this study, assessments of candidates' performance were based on three sources of evidence: samples of student work, video recordings of classroom practice, and documentation of accomplishments outside the classroom. In addition, teachers undertook a content knowledge assessment. Evidence was submitted in the form of responses to four portfolio entries. Candidates who pass certification become NBCTs for 10 years.

The National Board Certification project intervention

In addition to engaging individual teachers in the pursuit of certification, this project intervention consisted of three additional components intended to promote the pursuit of certification as an opportunity for school, as well as individual, learning:

01 Organise a group of teacher candidates from within the same school to pursue certification together (a school cohort);

02 Provide expert NB support to each school cohort in the form of a support provider from Stanford's National Board Resource Center (NBRC);

03 Provide on-site support to candidates in two ways: a formal support role for an NBCT at the school and monthly certification support meetings for candidates facilitated by the NBRC support provider in collaboration with the school support provider.

To study the intervention, we documented the candidates' work and the support they received during the 2013-14 school year and administered a survey to project participants. We collected field notes from their monthly support sessions and recorded selected conversations between candidates and support providers. In fall 2014, we interviewed a representative sample of teacher candidates from each school who participated in the project, and we analysed the candidates' NB portfolio submissions, including the video recordings of their teaching and student work samples. We interviewed the on-site support providers and principals at each school and the NBRC support provider.

Schools

The two participating schools were located in mid-size urban districts. In both cases, fewer than half of the students were proficient on state English language arts and maths standardised exams and over half the student population qualified for free and/or reduced lunch and spoke English as a second language. Each school had a large proportion of teachers on staff interested and willing to pursue NB Certification, a principal who agreed to support teachers' participation in the project, and an existing NBCT on staff who was willing to participate in the project as an on-site support provider to candidates and work with the NBRC "expert" support provider.

One school had 10 teachers participate in the project in 2013–14. Four of these 10 teachers received certification in 2014. At the other school, there were 11 teachers; in 2014, none of these received full certification; most had decided to submit only one or two of the four required entries. However, four resubmitted portfolio entries the following year and in 2015, one of these teachers certified.

Findings

The differences in the instructional approaches valued in the two schools and districts, as well as the available National Board expertise, influenced the way the project played out in each school. Nevertheless, we found the project had positive influences on individual teachers and the schools in which they worked. Specifically, we found:

01 Teachers strengthened aspects of their teaching through their participation in the NB Certification process;

02 Pursuing NB Certification with a group of school colleagues who received ongoing support from on-site NBCTs as well as from an expert support provider seemed to increase teachers' opportunities for learning; and

03 The project, as designed, laid the initial groundwork for changing aspects of school teaching culture – such as creating a community of teachers in which teaching became "de-privatized," where teachers had a common focus on improving student learning, and where practices developed to support teacher learning about instruction. These are all important elements of cultivating professional communities for teacher learning that are strongly associated with improved student performance (Seashore-Louis et al., 2010).

Instruction

We found that teachers made changes to the way they designed student tasks, delivered individual and whole class instruction, and assessed students' performance. This was true for teachers of every subject and grade level who participated in the project, both veteran and less experienced teachers. There were two categories of changes that teachers made to their teaching practice that increased the likelihood for student learning:

- Teachers looked more closely at what their students did and said and consequently got to know their students' strengths, interests, and needs better;
- Teachers became better able to design instruction that met the particular strengths, interests, and needs of their students.

These changes were often intertwined and mutually influencing.

All teachers in the study indicated that the changes "to their practice" came about through their participation in the project in three ways: preparing portfolio entries, learning with and from school colleagues who also participated in the project, and receiving support from NB support providers. Each of these experiences gave teachers opportunities to closely examine instructional practice and the resulting student learning, as well as to identify missed opportunities for learning.

Early indicators of change to teaching cultures

Teachers reported small, but meaningful, changes in their school cultures after the one year project, particularly in terms of how they worked with one another and with other teachers and/or families at their school. To varying degrees, the teachers at both schools reported developing stronger and more trusting professional relationships with other project participants. While one year is too soon to know if, or how, these stronger professional relationships and small changes to the teaching cultures will contribute to permanent changes in how teachers at these schools conduct their work, groundwork has been done in both schools to prepare environments where teachers are more open to learning from one another and from members of the broader school community in order to further student learning.

The school-based cohort model

We found that the school-based cohort structure, coupled with the support providers, seemed to increase teachers' opportunities for learning. This design for giving support to candidates illuminated the important role that support providers can play in developing teachers' learning and in creating the conditions for collaborative inquiry into teaching practice. We found that support providers in the project played important roles in stimulating and supporting teachers to make changes in their teaching.

- The external support provider brought expertise to the project in terms of designing curriculum to support certification, knowing the ways to ask candidates questions to help them critically view their own teaching through the lens of the National Board Standards, and providing coaching to the school-based support provider on how to ask candidates probing questions about their teaching and its effects on student learning.

- The on-site support providers played a different and important role by providing readily accessible emotional and logistical support to candidates as well as providing feedback to candidates on their developing portfolio entries.

The study suggests that organizing and supporting cohorts of teachers within the same school to pursue NB Certification supports multiple beneficial outcomes. The study also suggests, however, that other additional supports are necessary to sustain a substantive alteration of a school's professional culture. The principal has an important role to play in developing a school culture that supports continuous teacher learning and in connecting the NB Certification project work to other instructional improvement efforts going on in the school and district.

This case study is an extract from the full report Jaquith A, Snyder J and Bristol T (2016) Turning Schools Around: The National Board Certification Process as a School Improvement Strategy. Stanford, CA: Stanford Center for Opportunity Policy in Education.

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CASE STUDY

The Chartered College of Teaching's Chartered Teacher Programme

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The Chartered College of Teaching aims to raise the status of the teaching profession. One way in which it is doing this is by establishing a rigorous, high-status certification programme to recognise excellence in teaching – the Chartered Teacher Programme.

Given the importance of high-quality teaching in improving pupil outcomes (Education Endowment Foundation, 2019), developing a new programme that recognises teacher expertise and enables progression while remaining in the classroom, rather than requiring a move into leadership, was seen as crucially important. With this in mind, the Chartered College of Teaching took a year to design and develop the Chartered Teacher Programme, working alongside teachers, school leaders, teacher educators and researchers.

The programme's Professional Principles – the standards that participants must demonstrate they meet – are derived from a wide research base on the features of effective teaching and the elements that constitute teacher expertise, as well as consultation with our members on what Chartered Teacher status should signify. The programme itself and its assessment processes are also built upon what is known about the most effective forms of professional development, as well as the features of the most successful international teacher certification programmes.

The assessment programme takes 15 months for teachers to complete, and recognises the knowledge, skills and behaviours of excellent teachers. The Chartered College of Teaching has recently awarded Chartered Teacher (CTeach) status to the first cohort of teachers to undertake the programme – an important milestone for the Chartered College of Teaching and, with concerns around teacher recruitment, retention and development, for the profession as a whole.

The Professional Principles – a standard for the profession

The Professional Principles cover every aspect of a teacher's day-to-day experience, from subject knowledge, pedagogy, planning and behaviour management, to teacher

collaboration and career-long professional learning. The process of developing these was detailed and collaborative, working with teachers and school leaders from across the education sector, as well as consideration of expert teaching models internationally. They are flexible and broad whilst also remaining rigorous. A key element of the Professional Principles is that they allow teachers to confidently assess their strengths, areas for development and how they can best proceed with ensuring that they are an evidence-informed teacher, both now and throughout their career.

Assessments within the Chartered Teacher Programme

All assessments and assignments are based upon the Professional Principles. Participants complete a number of assignments and examinations across the 15 months of the course, from debates with their peers to completion of a professional development plan setting out their objectives for the programme. Participants also complete a literature review of educational research from an area of their own choosing, leading to a research-based improvement project in their setting.

As part of the programme participants also sit a written and oral subject- or phase-specific exam. These exams sit alongside an Objective Structured Teaching Exercises (OSTE), building on medical OSCE models, and finally, a multiple-choice test on their knowledge of assessment and feedback practices.

The programme is deliberately designed to be 'sustained, intensive and content focussed' (Yoon et al., 2007, p. 1), allowing teachers to engage with research and evidence in determining what is best for their students in their setting, with regular opportunities for participants to demonstrate their learning. The variety of assessments, written, oral and scenario-based, are designed to be robust and valid, enabling dependable judgments to be drawn from them (Kime, 2017).

Collaboration – working together to support teachers

The opportunity for participants to collaborate and learn together is critical to teachers' development (Timperley et al., 2007). Within the Chartered Teacher Programme, participants are encouraged to work together with their peers in forums – online groups where they can discuss ideas and challenges. Alongside peer support, the programme facilitates expert challenge, another critical feature of professional development (Cordingley et al., 2015), with experienced mentors advising, supporting and feeding back to participants.

This model of support means that teachers can share pedagogical practice, resources and advice with their peers on the programme. They also have access to targeted guidance on their teaching, supported by evidence of their practice captured through a video portfolio assignment using Iris Connect. This involves participants setting their own development goals and undertaking deliberate practice (Deans for Impact, 2016) around their chosen skills. Through sharing their portfolio with their peers and mentors for feedback, teachers get the opportunity to develop their skills over time with expert mentor guidance and peer support, creating a robust system of collaboration throughout the Chartered Teacher Programme.

Impact

As the Chartered College of Teaching enters the second year of the Chartered Teacher Programme, our participants are already seeing the value of the programme and its impact on their practice and professional development. Comments from pilot participants include 'It has given me professional support and opportunities that I would not otherwise have experienced' and 'I am a far stronger and more knowledgeable teacher than I was eighteen months ago'. We are supporting a generation of teachers to be more evidence-engaged, raising the status of the profession through using research and evidence to improve pupil outcomes.

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The role of professional culture in teacher development

02

Developing workplaces where teachers stay, improve and succeed

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When you study education policy, the inevitable question about what you do for a living always gets the conversation going. Controversies over teacher unions, charter schools, and standardised testing provide plenty of fodder for lively debates in the US, for example. People often are eager to share their own experiences about individual teachers who profoundly shaped their lives.

A large body of research confirms this common experience – teachers have large effects on students' learning, and some teachers are far more effective than others. What is largely absent in these conversations, and in the scholarly literature, is a recognition of how these teachers are also supported or constrained by the organisational contexts in which they teach.

The absence of an organisational perspective on teacher effectiveness leads to narrow dinner conversations and misinformed policy. We tend to ascribe teachers' career decisions to the students they teach rather than the conditions in which they work. We treat teachers as if their effectiveness is mostly fixed, always portable, and independent of school context. As a result, we rarely complement personnel reforms with organisational reforms that could benefit both teachers and students.

An emerging body of research now shows that the contexts in which teachers work profoundly shape teachers' job decisions and their effectiveness. Put simply, teachers who work in supportive contexts stay in the classroom longer, and improve at faster rates, than their peers in less-supportive environments. And, what appear to matter most about the school context are not the traditional working conditions we often think of, such as modern facilities and well-equipped classrooms. Instead, aspects that are difficult to observe and measure seem to be most influential, including the quality of relationships and collaboration among staff, the responsiveness of school administrators, and the academic and behavioural expectations for students.

School context and teacher turnover

Schools are complex organisations. Classic studies by Dan Lortie (1975) and Susan Moore Johnson (1990), based on intensive observations and interviews, bring to life

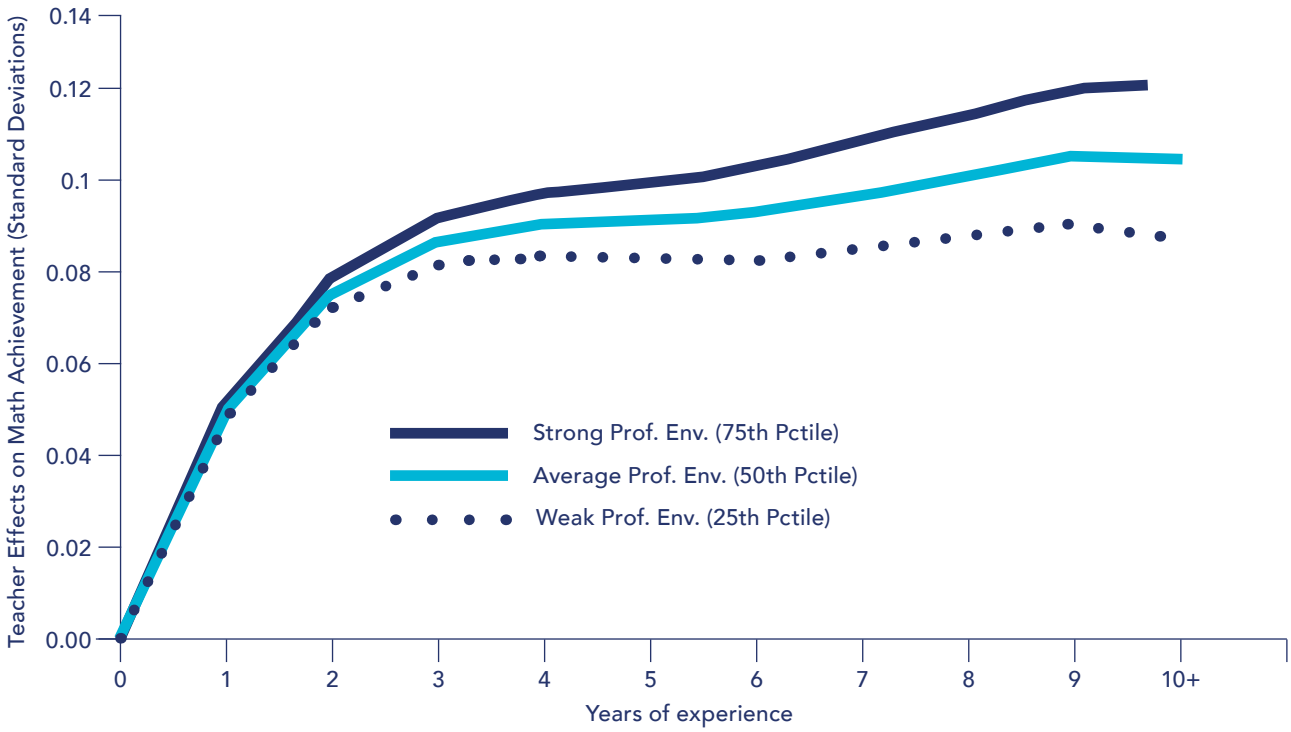

Figure 1: Predicted returns to teaching experience across schools with strong, average and weak professional environments (Kraft and Papay, 2014)

the "constellation" of organisational features that shape teachers' and students' daily experiences.

In recent years, large scale teacher surveys have provided researchers with new data to quantify these organisational features. These data have revealed that the high rates of teacher turnover we observe in schools that serve large populations of low-income and minority students are largely explained by the poor working conditions in these schools – not the students they serve. In Massachusetts, for example, teachers are over three times more likely to report intentions to transfer away from a school with poor working conditions than one with strong working conditions (Johnson et al., 2012). The finding that teachers' views of their working conditions are strong predictors of whether or not they stay in a school has been replicated in a wide range of districts and states in the US, including California, North Carolina, New York City, and Chicago.

School context and teacher development

In supportive schools, teachers not only tend to stay, but they also improve at much greater rates over time. In a recent study, we tracked teachers in Charlotte-Mecklenburg Schools for up to ten years and examined how their individual effectiveness (as measured by contributions to student achievement) changed over time (Kraft and Papay, 2014). As shown below (Figure 1), we found that teachers working in schools with strong professional environments improved, over 10 years, 38 percent more than teachers in schools with weak professional environments.

Here, we used six measures drawn from teacher surveys to characterise the environment: consistent order and discipline; opportunities for peer collaboration; supportive principal leadership; effective professional development; a school culture characterised by trust; and a fair teacher evaluation process providing meaningful feedback. Researchers from the University of Michigan and Vanderbilt have since used a similar research design to show that teachers in Miami-Dade County Public Schools improved at substantially faster rates in schools where effective collaboration takes place through instructional teams (Ronfeldt et al., 2015).

How should policymakers and practitioners act on these findings?

These findings, and a growing body of evidence, make clear that the school context matters a great deal for teachers and, as a result, for their students. Furthermore, school contexts are not set in stone – new evidence documents that working conditions in schools can improve over time, and that teachers are responsive to these changes (Kraft et al., 2016). However, simply saying that contexts matter and can change does not give policymakers and practitioners clear guidance about how to strengthen organisational practices in schools. Although the collective and interpersonal nature of school contexts makes quick policy fixes unlikely to succeed, research suggests several concrete ways in which educators and policymakers can take on this challenge.

A recent study within Susan Moore Johnson's Project on the Next Generation of Teachers at Harvard University (of which we were a part) provides some potentially promising levers (Charner-Laird et al., 2014). The study involved in-depth case studies of teachers' experiences in six high-poverty, high-minority, urban public schools. Across the schools, teachers spoke about how specific supports facilitated their ability to succeed with their students. Teachers described the value of establishing an orderly, disciplined learning environment, student support services to attend to social and emotional needs, and efforts to engage parents. Furthermore, research suggests that peer collaboration, feedback (from both peers and administrators), and instructional support can all be effective tools for building strong work environments and promoting teacher development.

Importantly, school principals play a key role in establishing productive professional environments in schools. They are the ones who establish these organisational supports and build school-wide cultures. Hiring principals who have the ability to identify organisational weaknesses, establish school-wide systems to support teachers and students, and galvanize the collective buy-in and involvement of all teachers is a central lever for improving the teaching and learning environment.

Analyses of large-scale teacher surveys confirm what educators and qualitative researchers have long known, school contexts matter. We hope this evidence will push public debate and policy about education reform to recognise and be responsive to this reality of working in schools. It's time to change the conversation.

This article was originally published by the Shanker Institute at: *http://www.shankerinstitute.org/blog/developing-workplaces-where-teachers-stay-improve-and-succeed.*

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Understanding teaching as a profession

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Teacher professionalism is a contested idea, with varying viewpoints put forward about whether and how to increase professional autonomy or regulate how professionals operate in their practice, as well as the role of professional development and learning. The OECD's (2016) research showed that teacher perceptions of how their profession is valued varies across countries, while top-down regulation and accountability regimes have arguably led to de-professionalisation and reduced professional status in many countries, including England (Guerriero, 2017).

In this article, we look at the idea of professionalism in teaching, through an exploration of concepts of professionalism and the role of professional bodies, particularly in relation to professional development. We then draw out some possible lessons for the teaching profession.

What is a profession?

What makes a profession is disputed, and has been for some years (for example, see Demirkasimoğlu, 2010; Evans, 2008; Whitty, 2000; Hanlon, 1998). Evans (2008) gives a useful summary of some of these debates, which emphasises the importance of contextual factors, particularly that of policy, and the socially constructed nature of the term 'professionalism', which has evolved over time to 'serve different interests' (Helsby, 1999 p. 93 cited in Evans, 2008, p. 22). Also important are perceptions of quality of practice and the public status of an occupation (Sockett, 1996 cited in Evans, 2008).

In the 1950s and 60s, sociologists created lists of the characteristics of a profession, including, for example, certified education and training in 'skills based on theoretical knowledge, being able to use those skills in practice, a code of professional conduct oriented to the "public good" and powerful professional organisation' (Whitty, 2000 p. 281). Those occupations which did not meet these criteria were known as 'semi' or 'quasi' professions. These discussions were often focused on models observed in medicine and law (Whitty, 2000).

Profession	Semi-profession
High level of public trust and confidence in the profession and in individual practitioners.	Lower in occupational status.
Protracted preparation period, usually in a professional school on a college or university campus.	Shorter training periods.
Members of the profession are involved in making decisions in the service of the client, and decisions made are in accordance with the most valid knowledge available, against a background of principles and theories.	Lack of societal acceptance that the nature of the service and/or the level of expertise justify the autonomy which is granted to the professionals.
Collectively and individually, the profession possesses a body of knowledge and a repertoire of behaviours and skills, which normally are not possessed by the non-professional.	A less specialised and less highly developed body of knowledge and skills.
The profession is based on one or more underlying disciplines upon which it builds its own applied knowledge and skills.	Markedly less emphasis on theoretical and conceptual bases for practice.
Relative freedom from direct on-the-job supervision and from direct public evaluation of the individual practitioner. Professionals accept responsibility in the name of their profession and are accountable to society through their profession.	More subject to administrative and supervisory surveillance and control.
Authority to practice derives from the client or the employing organisation; accountability for the competence of professional practice is to the profession itself.	Less autonomy in professional decision making, with accountability to supervisors rather than to professions/professional bodies.

Table 1: Differences between a semi-profession and a profession (adapted from Gomendio, 2017)

More recently, Gomendio (2017) details some critical differences between a profession and a semi-profession (Table 1). Whether teaching fits into the category of profession or semi-profession may vary across countries; for example, where teachers' perceptions of the societal value of teaching differs (OECD, 2016). In Finland, teachers enjoy a high status, where they are trusted and valued as professionals (Sahlberg, 2011), and develop expertise through a research-based approach to practice (Tirri, 2014). By contrast, the lower perceived status of teaching in England means that it may fall into the category of a semi-profession rather than a true profession.

In England, and some other countries, teaching has arguably been deprofessionalised by frequent, ongoing regulation and accountability measures imposed by the state in a top-down system. Some might believe that the introduction of standards and accountability in teaching helps to ensure 'best practice' and quality (Krishnaveni ve Anitha, 2007 cited in Demirkasimoğlu, 2010) and is in accord with contemporary standards seen in other professions. However, teaching differs from other occupations in the professional autonomy granted in the setting of standards and in holding professionals to account.

What do we mean by professionalism?

As described above, the idea of what makes a profession is much discussed. It will come as no surprise, therefore, that concepts of professionalism are similarly disputed. The term is used 'in different senses and [is] somewhat difficult to define' (Demirkasimoğlu, 2010, p. 2048). The concept of professionalism is dynamic, with many definitions, resulting in different functions; it is influenced by multiple sources including government, educational theory, practice and wider society, and by

The nature of professionalism (Demirkasimoğlu, 2010)	Five elements of professionalism (adapted from Friedson, 2001 in Guerriero, 2017)
• respectability of the occupation • improvement of service quality • achievement of the highest standards • self-control • professional autonomy	• specialised work grounded in theoretically-based, discretionary knowledge and skill • exclusive jurisdiction in a particular division created and controlled by occupational negotiation • a sheltered position in labour markets based on credentials created by the occupation • a formal training programme giving credentials, controlled by the occupation and associated with higher education • an ideology of commitment to doing good work prioritised over economic gain and to the quality of work

Table 2: Characteristics of professionalism

professionals (including teachers) themselves (Goepel, 2012; Demirkasimoğlu, 2010; Tichenor and Tichenor, 2005).

Overall, professionalism appears to bring together a combination of factors, including but not limited to the qualifications needed, autonomy as a profession and as a professional, trust from stakeholders, social status, a commitment to serving society, quality of service with a drive for growth in learning and discretionary knowledge and skills. Keay and Lloyd (2009) note that many of the discussions around professionalism include references to control, knowledge and ownership. For example, Table 2 shows two sets of characteristics of professionalism found in the literature.

These two sets of characteristics have similarities in terms of training, service, standards and specialised work/theory leading to respectability, status and autonomy. Farrugia (1996) notes that occupational group members (e.g. doctors, lawyers, dentists) are able to maintain their credibility and claims to professionalism, gain appreciation and prestige by virtue of their service in contributing to the welfare of society.

Autonomy appears to be key to professionalism. Some professions have a licensed form of autonomy, and others regulated forms of autonomy (Dale, 1989 cited in Whitty, 2000). For example, medicine and law, and arguably nursing, have to some extent been 'licensed' or permitted to manage their own affairs, including training and professional development, working from the strength of a well-established professional body (see below). If a profession's contributions to society are proven to be consistently reliable via both internal and external audit, then the profession is more likely to be given a greater level of autonomy. This links to ideas of trust, in terms of technical competence and of trusting professionals to 'monitor and control'

Professional body	Role of professional body	Defined minimum amount of CPD
Nursing and Midwifery Council (NMC)	Regulatory body	35 hours over 3 year revalidation cycle
General Dental Council (GDC)	Regulatory body	100 hours over 5 year revalidation cycle
Royal College of Surgeons (RCS)	Membership organisation. Various levels of membership	At least 250 hours over 5 year revalidation cycle
Institute of Chartered Accountants in England and Wales (ICAEW)	One of three bodies to confer chartered accountancy status	Required annual declaration of CPD

Table 3: examples of professional bodies and professional development requirements

their work and to ensure that the carrying out of this work is done correctly (Hanlon, 1998). This trust in turn provides greater autonomy and freedom to professions to manage and discipline themselves. An example of this is demonstrated not only by the lengthy training expected in order to establish professional status, but also in ongoing obligations around continued professional learning and validation as an integral part of the professional role.

The role of professional bodies

Professional bodies exist across many contexts in order to regulate, monitor and set the standards for professions. They may be independent membership organisations or funded directly by government, with varying levels of independence and autonomy. Their roles often include many of the regulatory and monitoring features of a profession and professionalism described above.

Many professional bodies have a role in providing, accrediting, quality assuring and/or monitoring ongoing professional development. To illustrate this, we have chosen four professional bodies from England. As noted earlier, these professions, to a greater or lesser extent, have a 'licensed' form of autonomy, where an occupation is permitted to manage its affairs. Table 3 shows the professional bodies for these four professions (although it should be noted that there are three such bodies for accountancy in England) and their relationship to professional development. For the medical professions there are cycles of revalidation with specified amounts of professional development to be carried out within each cycle.

Professionals are offered varying amounts of autonomy in terms of their choices around professional development, with the professional body providing, in varying ways, guidance, accreditation, quality assurance and/or professional development opportunities. This serves to highlight the ways in which professional status and professionalism are linked to an obligation to engage in continued training and education, underlines the value that these occupations place upon professional development and highlights the expectation that members commit to full participation in the refining and building of their knowledge and skills in order to remain members of their profession (Links, 2018; Farrugia, 1996).

'Old' professionalism	'New' professionalism
Exclusive membership	Inclusive membership
Conservative practices	Public ethical code of practice
Self-interest	Collaborative and collegial
External regulation	Self-regulatory
Slow to change	Policy active
Reactive	Enquiry driven, knowledge-building

Table 4: Comparison of old and new professionalism (Sachs, 2003 in Keay and Lloyd, 2009)

Professionalism in teaching

As we have mentioned above, teaching in England has been subject to varying levels of top-down regulation since the 1970s (Whitty, 2000). 'Autonomy has given way to accountability' (Hoyle and Wallace, 2005 cited in Evans 2008, p. 100) and regulation in teaching has become the norm. In England, in 2019, then, teaching appears to have moved into a 'post-professional' age (Hargreaves, 2000), in which 'teachers are caught in the struggle between different groups and forces that are seeking to define and redefine teacher professionalism' (Goepel, 2012, p. 493).

Teacher standards form part of a performance culture whereby pupil learning outcomes are used as a measure of teacher performance, and 'standards and accountability go hand in hand and in some respects have become the tool for managing and overseeing teacher accountability' (Sachs, 2016, p. 416). In this way, teacher professionalism is based around a perceived idea of proficiency in achievement outcomes (Demirkasimoğlu, 2010).

As we have noted above, governance and self-regulation are closely related to professional autonomy (Guerriero, 2017) and the erosion of these leads to loss of professional control and in turn a lower perception of professionalism overall, both within and outside the professionals involved. This threatens trust, which again is a vital part of the granting of autonomy to professions (Hanlon, 1998). A lack of trust in turn limits teachers' ability to take the initiative as professionals in choosing professional development and to share its benefits, leading to a 'vicious cycle of low expectation leading to over-direction and prescription and restriction of opportunities' (Cordingley et al., 2019, p. 107).

These tensions, along with those described in earlier sections around what constitutes a profession more widely, have fed into calls for a 'new' type of professionalism in teaching (Sachs, 2003 in Keay and Lloyd, 2009) (Table 4).

Building on the idea of new professionalism as a route to transformation, Kennedy (2007) suggests two models of professionalism: 'managerial' and 'democratic', which could be seen as 'competing versions' of teacher professionalism (Whitty, 2000, p. 282). The former values effectiveness, efficiency and compliance with policy – qualities

needed to pass inspections or imposed standards. The latter emphasises collaborative action which values self-regulation and inclusive approaches.

A democratic, new model of professionalism might lead to a more proactive system where professionals set their own standards and self-evidence that these have been met (Keay and Lloyd, 2009). In this model, participation is fostered and participants take or are given ownership, through 'internal control' (p. 659) rather than it being imposed upon them. This democratic professionalism relies on discourse between professional groups, a sense of autonomy and discretionary judgement within complex practices (Evetts, 2009).

Professional development and professionalism

One way of granting a degree of this 'internal control' and moving towards a more democratic teaching profession could be via professional development, which is a key part of professionalism in teaching (Guerriero, 2017). The OECD's Teaching and Learning International Survey (TALIS) report (2019) found that a positive impact of professional development, reported by teachers, is correlated to a high level of self-efficacy and/or job satisfaction. The report notes that 'the most successful education systems … have embedded professional development as an integral part of the work of teachers and do what it takes to facilitate participation' (p. 47). This illustrates how access to and engagement in professional development can be used to boost perceptions of professionalism.

Meanwhile, though, there is also substantial evidence that participation in professional development can be difficult, primarily because of the challenge of being released from teaching, and due to both cost and a lack of incentives to take part (OECD, 2019). The problem here may be a perception of the value of professional development. In other professions, engagement in professional development is seen as an integral part of being a professional; therefore the issue of release from school could be addressed by a promotion of the view that professional development is a part of teachers' day-to-day (Darling-Hammond, 2017). Recognition of both participation in, and the outcomes of, professional development is important, and so professional development 'needs more recognition as an essential attribute of the work of teachers and school leaders' (OECD, 2019, p. 47), ideally leading to more responsibility and resulting in career progression.

Incentivising participation can be achieved by various routes, including aligning professional development with the needs of teachers and schools, making it part of a school-embedded system allowing teachers and school leaders to help design or select appropriate learning opportunities, providing ring-fenced funds for professional development to schools, and enabling teachers and school leaders to determine where this is spent (OECD, 2019). As Evans (2011) suggests, the 'real shape of teacher professionalism will be that that teachers forge for themselves' (p. 868), through professional development which recognises the importance of intellectual and attitudinal development alongside skills and knowledge.

Conclusions

We have reflected on the nature of professionalism and what it means to be a profession, considering the position of teaching alongside that of other professions. We have seen that meanings of professionalism often focus around the perceived status, regulation and autonomy of practitioners, with professional bodies playing a part in promoting, validating and building the authority of the profession and have explored how these issues relate to professional development. Where a profession is subject to a top-down, managerial approach, professionalism may be limited. By contrast, where a profession is able to build its own guidelines and standards, independent of government, a more democratic, transformative form of professionalism is achievable.

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CASE STUDY

The Wellcome CPD Challenge

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Wellcome is a global foundation with a vision to improve health for everyone. Excellent science education underpins that vision. We want young people to enjoy science and, as a result, hope that they will take up careers in science. Teachers play a vital role in this. Evidence tells us that teaching quality is the most significant in-school factor for improving pupil outcomes (Sutton Trust, 2011). It follows that supporting science teachers throughout their careers is key to this improvement.

We believe that all science teachers should participate in high-quality, subject-focused continuing professional development (CPD) every year (Cordingley et al., 2018) but we recognise that this is unlikely to happen for science teachers unless there is systemic change for all teachers – of all subjects and in all phases (Sellen, 2016; Micklewright et al., 2014).

With this in mind, we set out to discover what schools and the wider education system would need to put in place in order for all teachers to participate in CPD every year. To do so, we set up an 'observatory' – the Wellcome CPD Challenge.

The Wellcome CPD Challenge is a pilot study of 40 primary, secondary and special schools in South Yorkshire, an economically and socially diverse area in the North of England. The 40 schools provide a representative sample consisting of a range of school types across location, OFSTED grading, size, and commitment to teachers' professional development. Schools have been tasked with meeting a set of CPD criteria so that each teacher undertakes at least 35 hours of high-quality CPD every year, all of which is aligned to their own professional development and learning needs and most of which is subject-specific. Provisional CPD criteria were chosen after careful examination of current CPD practice documented in the research literature (Cordingley et al., 2015). These criteria were tested on a wide range of stakeholders, after which they were modified before being finalised and adopted for the Challenge.

The Challenge, which is managed by the Sheffield Institute of Education at Sheffield Hallam University and evaluated by CFE Research, started in 2018 and will run for three years. At the outset, each school was required to identify a CPD Champion – a member of staff – to lead engagement in the project.

For the first two years, schools are being supported by SIOE in the following ways:

- termly 'briefing' meetings to support CPD Champions to explore the meaning and purpose of CPD, to explain current research and evidence and to provide opportunities to share approaches and practice
- SIOE facilitators are working with the CPD Champions in each school, through termly face-to-face meetings and telephone calls. Facilitators have a mentoring role, supporting the schools as they work towards meeting the CPD criteria, encouraging them to think more broadly about CPD and acting as critical friends as each school finds the professional learning path that best suits its context.

The evaluation seeks to understand each school's approach to meeting the CPD mandate. To establish the amount and type of CPD being undertaken, all teachers in pilot schools first compiled a baseline record of their CPD in the year before the pilot started. This meant documenting all instances of their CPD and indicating whether or not each included the aspects of quality listed in the Department for Education's standard for teachers' professional development (Department for Education, 2016) – for example, if it was underpinned by evidence, if it involved collaboration, and whether there was input from a subject expert. For the duration of the pilot, teachers are required to complete this record on a termly basis.

In addition to this, the evaluation includes annual attitudinal surveys to understand the views of teachers, school senior leaders, governors and CPD providers on CPD culture, including the impact of CPD. Case studies, some of which will be longitudinal, will provide a deeper understanding of the way in which individual schools meet the Wellcome CPD Challenge.

We will be reporting on the findings in December 2021, with emerging findings available from Autumn 2019.

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EXTENDED CASE STUDY

Forging the links between teaching quality, professional collaboration and organisational ambidexterity in three schools in Hong Kong

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Introduction

What drives some schools to become more successful in enhancing student learning outcomes and sustaining improvements beyond what would normally be expected, whilst taking into account broader factors like school context and intake? This is a common theme in theory and practice in the interrelated fields of educational effectiveness, school improvement and educational change (see Reynolds, 2007; Teddlie, 2010). Both international and local research findings indicate that many schools, including 'good schools'; defined as those with high academic attainment and a strong sense of stakeholder belonging, can resist change, and many also find it challenging to sustain improvements when facing constant education reforms (Gillborn, 2005; Lupton, 2005). Successful schools, meanwhile, are often outstanding in continuing to innovate and develop practice whilst maintaining rigour and consistency (Ko, Hallinger and Walker, 2012; Ofsted, 2009; Reynolds, 2010; Walker, Byrant and Ko, 2016).

This article adopts two theoretical perspectives – professional capital and organisational ambidexterity – to explore and explain the change management strategies and processes of three Hong Kong schools which successfully promoted teaching quality and learning outcomes through their approaches to professional collaboration and ambidextrous leadership. These schools were selected as schools with strong valued-added performance in two previous mixed-methods studies (Walker and Ko, 2011 and Walker, Bryant, and Ko, 2014 and 2016), and varied in terms of students' socioeconomic status, funding type, and characteristics of their principals. They also all had a need for change, as outlined below.

St John's College is a highly-reputed and highly-subscribed English medium-of-instruction school with students predominantly from the high socioeconomic background. It achieves outstanding academic attainment in public exams, as well as impressive non-academic outcomes. The school was changing its status from a Grant School that totally relied on government funding, to a Direct Subsidy School, which can receive extra income from tuition fees. The school therefore wanted to develop a new International Baccalaureate (IB) programme.

Christian Brothers Secondary's students come from a low socioeconomic community. It has outstanding academic attainment in public high-stakes exams. But its medium of instruction was Chinese, and the school decided they wanted to change their school status from a Chinese medium of instruction school to an English medium of instruction school. This required the school to demonstrate to the educational authority that teachers and students were ready to teach and learn in English, in all subjects except Chinese.

Trinity Church Secondary is located in a middle socioeconomic community and faces keen competition from other surrounding English medium-of-instruction schools, with a shrinking student population in the catchment area. The school chose to address this by developing its achievements in extra-curricular activities in drama into a school-wide drama education programme. The school also responded to accountability pressures positively by establishing a self-evaluation process that closely adhered to the educational authority's school-based management and accountability framework.

We conducted extensive interviews with the principal and ten to fifteen key staff and teachers in each school, twice over three years. We also examined their school development plans, school profiles, organisational charts and inspection reports from the education authority whenever they were available.

The professional capital perspective

The professional capital perspective advocated by many educational researchers (including Hargreaves and Fullan, 2012; Campbell, Lieberman and Yashkina, 2016; Nolan and Molla, 2017; Shirley, 2016) sees successful educational or organisational change as being dependent on promoting the professional capacities of teachers. Professional capital is conceptualised as being a function of:

- human capital, accumulated through various forms of continuous teacher professional development
- social capital, accumulated through collaborative cultures and professional learning networks
- decision capital, accumulated through professional autonomy and teachers' active participation in school governance and curriculum development.

Supportive policies that invest in teacher professionalisation can address all three of these areas, enhancing teacher quality and leadership by training and continuous professional development (human capital); promoting collective accomplishment and responsibility in learning networks in which teachers and other professionals can share knowledge, practices and experiences (social capital); and creating opportunities to develop leadership recognition of teachers' professional autonomy (decision capital).

Accumulating human capital: investing in teacher quality

Investing in teacher quality may lead to improvements in student performance, and policies on teacher education, licensing, hiring, and professional development can all strongly affect the qualifications and capacities that teachers bring to their work (Darling-Hammond, 2000). Existing staff in a successful school can respond to the demands of change through a positive mindset and enthusiasm for engaging in professional learning, while new teachers can bring in new capacities for change.

Building teacher capacity through professionalisation is a lengthy process that takes time and money. St John's College, for example, had access to more resources and autonomy when it became a Direct Subsidy Scheme School that is allowed to be more flexible in curriculum and programme development and to collect extra tuition fees from students. Thus, it succeeded in establishing its IB Diploma programme by hiring new teachers and reducing class sizes while increasing the number of learning

groups at a level that meant the number of teaching lessons per teacher was reduced for most levels for both the mainstream and IB programmes. The new IB programme also enabled new staff to take a faster track of promotion so that high quality teaching and exceptional student learning outcomes were rewarded. Christian Brothers Secondary, meanwhile, used English teachers as key change agents in the journey to make their school an English medium of instruction school; they were released from all administrative duties for five years and had to support their colleagues in developing new teaching skills and materials. At Trinity Church Secondary, after securing funds from the government's quality education funding scheme, teachers collaborated with academics from a local university in developing a curriculum on drama education with detailed teaching and learning approaches.

Accumulating social capital: enhancing professional collaboration of teachers

Many schools and systems are investing considerable energy in developing themselves as professional learning communities (PLCs) (Hargreaves, 2007; Talbert, 2010). Evidence of the impact of PLCs on promoting system improvement has been collected in both qualitative and quantitative studies (Anderson, 2006; Bolam et al., 2005; Louis and Marks, 1998; McLaughlin and Talbert, 2001). Whilst the key purpose of PLCs is to 'enhance teacher effectiveness as professionals, for students' ultimate benefit' (Stoll et al., 2006, p. 229), PLCs are considered catalysts of innovation because they are often formed through bottom-up processes and tend to have greater sustainability. They can enhance instruction by 'creating an environment that supports teacher learning through innovation and experimentation' (Bryk, Camburn and Louis, 1999, p. 771).

The features identified as important for successful school improvement are often related to the working relationships between teachers in the schools; including trust, communication and the presence of PLCs (Bryk et al., 2010; Wahlstrom et al., 2010). In St John's College, PLCs did not exist only in traditional subject departments. The IB programmes opened up new collaborations between teachers in the same subject but in different programmes, between teachers of different subjects in the same programme and between experienced teachers and new staff. At Christian Brothers Secondary, teacher collaborations occurred frequently between English teachers and other subject teachers, with regular but informal meetings. Teachers also collaborated in many school development projects and believed their achievements and collegial working relationship lay in their shared vision, trust, and communication. Teachers at Trinity Church Secondary, meanwhile, collaborated in their move from experiential learning in drama to integrating drama in teaching and learning in the classroom, and pedagogical innovations enriched both teachers' and students' experiences.

Accumulating decision capital: building leadership capacities

Whilst 'leadership' may still define the relationships between and amongst individuals, school principals are no longer regarded as the sole authority fulfilling all leadership roles. Instead, a new definition of leadership considers 'the exercise of influence on organizational members and diverse stakeholders toward the identification and achievement of the organization's vision and goals' (Leithwood, 2012, p. 3). Evidence in school improvement research underlines the importance of devolved leadership at different levels within the school (Hopkins, 2003; Hopkins et al. 1994). Aspects of the relational environment can be fundamental to differentiating improved schools from schools that have failed to improve (Rosenholtz, 1989) and are crucial for the use and development of teacher leadership (Mujis and Harris, 2007) and distributed leadership (Harris, 2009; Spillane, Halverson and Diamond, 2001).

Variations in departmental effectiveness are receiving more interest in the literature (Harris, 1998; Sammons et al. 1997), and are a key feature of 'within-school variation'. Leadership roles at department level can be an important missing link in secondary school improvement (Harris, 2001). Teachers at St John's College reported teachers working on both the school and student development programmes, and witnessed

significant progress among new teachers. Meanwhile, teachers – especially middle leaders – at Christian Brothers Secondary attributed much of their school's success to their collaborative decision-making and collegiality. Decision-making quality can be determined by cultural practices related to teachers' self-efficacy and participation in decision-making; their sense of community and professional interest; the principal's leadership practices; principal-teacher relationships; the clarity of school management and accountability, and the strength of the school's organisational effectiveness and culture (Cheng, 1996; Cheng, Ko and Lee, 2016).

Of course, an effective self-managing school requires not only autonomy, but also self-managing individuals and groups capable of performing cycles of planning, performing, monitoring, evaluation and reflection, to achieve ongoing pedagogical innovations and improve learning (Cheng, Ko and Lee, 2016). The new principal of Trinity Church Secondary firmly supported the planning-implementation-evaluation school development cycles advocated by the Education Bureau as he observed their value in enhancing the quality of their school planning.

The organisational ambidexterity perspective

The organisational ambidexterity perspective, posed by organisational change theorists, suggests that organisations are generally largely inert and resistant to change, with only a few being capable of successfully building dynamic capabilities and self-transforming (Birkinshaw and Gibson, 2004). Research on innovative organisations in non-educational contexts suggests that an accumulation of professional capital alone may not be sufficient to sustain existing capabilities and develop a long-term competitive advantage. Thus, teacher professionalism, as outlined above, may be a necessary but insufficient condition to sustain successful school change.

The term 'organisational ambidexterity' highlights the dilemma faced by organisations – including schools – as they often need to *exploit* their existing strengths and to *explore* their new potential at the same time. In the case of St John's College, for example, the school needed to exploit its strengths in its existing, successful mainstream programme, whilst exploring its potential in developing an International Baccalaureate(IB) programme. Christian Brothers Secondary similarly wanted to exploit its existing successes whilst exploring its potential to continue these in a different medium of instruction.

Whilst exploitation of strengths is usually possible with existing knowledge, the exploration of new potential generally requires 'learning and innovation (i.e. the pursuit and acquisition [of] new knowledge)' (Gupta, Smith and Shalley, 2006, p. 693). There is a lack of consensus around whether exploration of potential and exploitation of strengths are competing or complementary aspects of organisational decisions and actions, although it is widely recognised that balance between them is needed (Gupta, Smith and Shalley, 2006; Raisch and Birkinshaw, 2008; Tushman and Euchner, 2015).

This can all be particularly challenging in a school context; it is also not always clear what is most important to student learning achievement. There are often tensions between short- and long-term interests, whilst a focus on productivity gains can inhibit flexibility and ability to innovate (Abernathy, 1978; Benner and Tushman, 2003).

Two aspects of ambidexterity are identified here: contextual ambidexterity, or the schools' readiness to embrace change; and structural ambidexterity, or the pace and scope of change achieved.

Contextual ambidexterity

Shared vision, respect for different viewpoints and problem-solving approaches, competence building, and eagerness to learn and adapt new skills and knowledge are all characteristics of contextual ambidexterity (Wang and Rafiq, 2014). At St John's College, the principal believed that the move to a direct subsidy school scheme made every teacher in her school ready for change by creating new expectations because it allowed flexibility and incentives to build into the system, as well as by making "good

use of [the scheme] to enhance teachers' professionalism, capability, expectation and standard." Contrary to the literature on the significance of school culture (see Peterson and Deal, 1998; Hofman, Hofman and Guldemond, 2002; MacNeil, Prater and Busch, 2009), she insisted on the benefits of an incentive system and an entrepreneurial spirit that is "creative, innovative, making the best use of resources, thinking of the alternatives."

Teachers of Christian Brothers School, meanwhile, thought they were flexible to cope with external accountability because they felt they were ahead of the government policies. They also turned a limitation in their medium of instruction into an opportunity to improve. They succeeded in balancing exploitation and exploration as well as both incremental and radical changes. Finally, at Trinity Church Secondary, the teaching staff generally thought that their school change occurred naturally in harmony because most teachers joined the school when it was founded, and their Christian background helped to create a harmonious working relationship and a shared vision. As teachers and leaders meet regularly and make decisions, work and leadership were always distributed and they were more inclined to see education reforms as opportunities to improve. They appreciated having two dedicated teachers who had made drama a unique element for them to exploit and explore.

Structural ambidexterity

Considering both time and scope of change is also important. School-wide improvement is generally recognised as more difficult and much slower to achieve than subject-level improvement (Thooen et al., 2012). This means that schools are likely to find it easier to excel in some, rather than all subjects. And because different schools may be at different stages of development, the trajectory of school improvement across schools may not be accurately captured immediately in changes in academic attainment of students in public examinations.

At St John's College, the school had always achieved high academic attainment in most subjects, though its value-added results were less impressive when compared to schools of similar background. However, teachers and the principal had also been keen to develop students through enriched leadership and experiential learning programmes, and they have achieved success in their IB programme despite its short history. Thus, both the time and scope of change were impressive. Similarly, Christian Brothers Secondary achieved their English medium of instruction status within five years, so the time and scope of their school change were also impressive.

Unlike the other schools, Trinity Church Secondary did not seem to have a time pressure to change. Though the scope of change was school-wide, it did not attract much attention beyond the local community and the school maintained a low profile. Nevertheless, the impact of integrating drama into subjects was evident in the growing communication and leadership skills of the students, who are now conscious that drama is part of the heritage of their school.

Synthesising the professional capital and ambidexterity perspectives

A synthesis of the two perspectives has the potential to offer new insights into how successful school change occurs through investments in both professionalisation of teachers and development of ambidextrous strategies for achieving excellence and innovation. The professional capital perspective emphasises the critical importance of the professional and collective capacity of educational leaders and teachers in enabling educational change. The ambidexterity perspective, meanwhile, stresses the importance of readiness to change and the scope of change, particularly at the senior management level, in organisational change. Capacity for change therefore encompasses the principal's resource management, the school's PLC capacity, teachers' workload, alignment, coherence and structure, and resource capacity.

An ambidextrous school must be future-looking. When schools embrace change, they are future-oriented, active and energetic, with confident and proactive leadership (Walker, Bryant and Ko, 2016). The case studies above reveal that both leadership

and capacity for improvement are essential for school improvement. (Bryant, Ko and Walker, 2018; Ko, Hallinger and Walker, 2012). They also suggest that the professional capital and ambidexterity perspectives are not mutually exclusive, but rather that the factors identified as crucial for change in both educational and non-educational contexts are similar.

At a time when rapid social and technological changes are driving global education reforms and transforming teachers' roles, work, and development models in the process that forces them to pursue high-quality professional development, applying the ambidexterity theory to an investigation of the interplay between policy, leadership, alignments, networks, and time and scope of change can bring a range of systematic and organisational challenges into perspective.

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CASE STUDY

Lessons from Australia and New Zealand

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This article draws from research into the leadership of future-focused schools, the first phase of which was conducted from November 2018 to January 2019, funded through a Winston Churchill Memorial Trust Fellowship. The research involved primary, secondary and all-through schools in Australia and New Zealand. These case study schools all had above average levels of socio-economic disadvantage, had average or above average pupil progress and had self-identified or been profiled as innovative or future-focused.

Through semi-structured interviews and informal conversations with leaders and teachers, I explored how staff have worked together to embed a learning culture across their schools. Key features of learning cultures in these schools include a climate of mutual trust, inquiry and collegiality (ACER, 2016).

Making it safe to fail

School leaders in this research deployed a range of strategies to lower the risk of failure for their staff, including modelling risk-taking themselves. Diana, a teacher at Silverton Primary, Victoria, explained the culture that had been fostered by several successive principals towards new ideas:

> *If you could say why you wanted to do something and then if you had a go at it and even if it didn't work and you could come back and reflect… what could you change or how could you do it better?*

Viviane Robinson (2018) observes that when staff are asked to try new strategies, they can have underlying beliefs or concerns that prevent them from changing their behaviours, but which they are afraid to voice. For example, a teacher might be concerned about a new teaching strategy affecting behaviour, but doesn't want to

admit to worrying about controlling the class. Thelma, Head of Curriculum at Rooty Hill High School, New South Wales, described a tool used to address this. When introducing new strategies at the school, Thelma gave staff the opportunity to conduct a 'pre-mortem', where they explored the things that might go wrong. This opened up a space to voice personal concerns in a way that disassociated them from the individual.

Collaborating to increase learning

At each case study school I asked teachers about the most valuable professional development they had received. Most often, they said it came directly from their colleagues.Effective professional development frequently includes opportunities to work with colleagues to apply new learning and problem-solve challenges (Higgins et al., 2015). However, the comments from these staff alluded to more than the collegiate application of learning. The teachers worked side-by-side on a day-to-day basis, so they could continually observe their colleagues' practice and receive immediate, contextualised feedback about their own.

At Campbelltown Performing Arts High School, New South Wales, Years 7 and 8 followed an integrated curriculum, bringing together curriculum aims from multiple subjects within real-world projects. Teams of three subject specialists worked together to plan their lessons throughout the year. This resulted in 'really powerful collaboration between teachers' (Stacey Quince, Principal).

In the most effective professional learning, leaders are actively involved in the learning process alongside their colleagues (Timperley, 2008). Stacey worked and learned alongside her staff to plan modules that would meet curriculum requirements, trialling approaches and refining them over time.

Although a less collaborative process might feel more efficient, staff in the case study schools emphasised the value of working together. At Rooty Hill High School, teacher Yasodai Selvakumaran explained why all teachers, including new teachers, were involved in developing programmes:

> *We've seen the best results when we have teams of teachers working on the development of each programme...*

Schools can struggle to foster collaboration for multiple reasons, including time constraints (Kraft et al., 2015; Vangrieken et al., 2015), but in the schools I visited, the design of the timetable, of learning and of physical spaces pre-disposed teams to collaboration.

Hornby High School, Christchurch, was part-way through being re-built, with science and technology labs around a central learning space for art and textiles. Although there was an office space for teachers, many gravitated towards the central learning space to do their planning. Consequently, their thinking naturally collided. Robin Sutton, the principal, observed how teachers from different specialisms were, without prompting, starting to discuss what they would be covering with a year group and then making cross-curricular links in their planning.

Conclusion

In the case study schools, if a certain mindset or behaviour was considered valuable for staff, it was supported by systems and structures within classrooms and across the school. The narratives elicit questions for teachers and leaders aspiring to create a similar culture in their context:

- What processes and frameworks have I established for trialling new ideas? What opportunities are there to fail, reflect, learn and improve?
- How do I create low-risk opportunities for colleagues to talk about concerns when learning something new?

- How are opportunities created for students and colleagues to share feedback and learn from one another?
- How do timetables, processes and physical spaces facilitate or inhibit collaboration?

Too often, initiatives are introduced into schools with insufficient consideration of their fit with the existing systems or culture. However, initiatives cannot be viewed in isolation; their effectiveness depends on their coherence with the wider educational environment (e.g. Godfrey, 2016; Yeager and Walton, 2011). This results in a final two questions for teachers and leaders who want to embed a strong teacher learning culture:

- How well do I model the mindsets and behaviours that I expect of my colleagues?
- How coherent are these expectations with the systems and structures in my classroom or school?

This article is an edited version of Theobald R (2019) Hold up the mirror: Examples of embedding a cross-school learning culture from Australia and New Zealand. *Impact* 5: 77–80.

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CASE STUDY

The Chartered College of Teaching: Building a strong professional culture at every level of the system

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Developing, supporting and connecting teachers and raising the status of the teaching profession sit at the heart of the vision of the Chartered College of Teaching. Ultimately, of course, this leads to improved outcomes for the children and young people who are expertly served by our teachers; the quality teaching they receive is the most important in-school factor in influencing pupil outcomes and narrowing the attainment gap (Sutton Trust, 2011).

Having relentlessly high expectations for children and young people therefore also means having relentlessly high expectations for how we support and develop our teachers – and this involves more than just high-quality CPD. The culture and professional environment in which our teachers are working is crucially important – both because we know that for CPD to be effective, it needs to be prioritised by leadership (Cordingley et al., 2015), and because professional culture itself plays a huge part in how teachers are supported and developed.

For example, Kraft and Papay (2014) looked at the differences between schools in the United States where teachers continue to develop throughout their careers, beyond just the early learning curve, and those where teachers' effectiveness stagnated over time. The features of schools where teachers continued to become more effective included opportunities for professional learning, chances to collaborate with other teachers, consistently enforced behaviour policies, a culture of trust, a focus on pupil attainment, and any teacher evaluation processes being focused on development. These features are mirrored in Sims' (2017) exploration of the factors that influence teachers in England's job satisfaction and retention, based on TALIS data.

We believe that these principles apply not just in schools, but at every level of the system. For schools and school trusts to maintain a strong professional culture, they need to exist in a system where this is also the case. That is why organisations like the Chartered College of Teaching are so important.

As the professional body for teachers and school leaders in England, the Chartered College of Teaching builds on over 150 years of history and a royal charter through its predecessor organisations, and yet membership to the body in its current form

has been open for just over two and a half years. In those two and a half years, much has been achieved in the goal of raising the status of teaching and promoting teacher development, professionalism and autonomy:

- an award-winning, nationally and internationally-renowned peer-reviewed professional journal has been launched and nine issues published
- a programme of advanced teacher certification, leading to Chartered Teacher Status, has been piloted and is now in its first full cohort, with over 100 teachers having graduated as Chartered Teachers in July 2019, and school-based and fully online models in design stages
- a membership structure including Fellowship has been established, with Fellowship representing the highest accolade for educators who have made a significant contribution to the profession; over 500 Fellows have been nominated and admitted
- an expert Leadership Development Group has been established, as well as an ethical leadership forum, and we are designing a new Chartership programme to recognise highly effective leadership of learning
- Chartered College of Teaching staff, Members and Fellows have contributed to important national policy and strategy, including around teacher induction, CPD, teacher wellbeing, diversity, character education, education technology, curriculum and the arts.

The Chartered College of Teaching also provides members with access to an extensive education research database, an online collection of teachers' case studies, research summaries and reviews, face-to-face and online opportunities to connect with other members, and a range of flexible CPD and coaching opportunities building on effective use of technology.

Of course, we remain a relatively new organisation, and building strong professional culture at a system level takes time – but we are already beginning to see the benefit of a strong professional body, representing and developing an informed, collegial profession that is trusted, developed, supported, and recognised for their expertise.

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Designing and measuring effective teacher development

03

Professional development: Evidence of what works

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What works in teachers' professional development? It's a simple question covering a massive field. A similar question in another field might be: how do you improve chefs? Or how do you make musicians better? These are almost ludicrously broad questions which expose just how difficult it is to identify a simple answer in the field of teaching.

There is unlikely to be one single 'recipe' that works in all cases but in recent years the evidence has been converging on a number of features that seem to be more commonly present when the professional development of teachers has positive outcomes.

What do we mean by 'what works'?

To precisely define the effectiveness of teacher development, we might begin by identifying a measure that captures whether the quality of education has improved. But the purpose of education has been notoriously difficult to pin down (see Education Select Committee, 2015, and Foshay, 1991).

In the absence of consensus, the literature on teacher effectiveness – and consequently teacher development effectiveness – tends to focus on whether the professional development appears to improve either pupils' outcomes in nationally standardised tests or other, more bespoke assessments, or teacher practice, which is typically based on observational rubrics by other professionals or inspectors. Additionally, some literature includes self-reported views from teachers and students (e.g. Ko et al., 2016). Most reports look at the impact on teachers and professional development in the short term, rather than longer-term outcomes.

Different evidence reviews take varying positions on what evidence to include and exclude. Some commonly-cited reviews (e.g. Timperley et al., 2007) include a range of

study methodologies where others (e.g. Yoon et al., 2007) have much stricter inclusion criteria to only the highest-quality randomised control trials.

However, the evidence base is also somewhat limited. Inevitably, the highest quality, and therefore most expensive evaluations tend to be associated only with the largest programmes of activity and these are often carried out by national or regional governments, large universities and/or large NGOs and philanthropic bodies. This leads to a dearth of evidence from smaller, more informal approaches, from school-to-school approaches and from shorter-lived and more inexpensive approaches. Evidence tends to come from richer countries and the professional development may be just one element in a larger intervention.

Reviewing key features of effective teacher professional development

In order to identify areas of consensus about teachers' professional development, I've looked at some major systematic and umbrella reviews from 2015 onwards in order to identify commonly agreed features of effective development for teachers.

Four recent general evidence reviews which cover all types of teacher PD are:

- Cordingley et al.'s 2015 review, *Developing Great Teaching*, for the Teacher Development Trust
- Kennedy's 2016 review, How Does Professional Development Improve Teaching?
- Mandaag et al.'s 2016 review, Features of effective professional development interventions in different stages of teacher's careers
- Darling-Hammond et al.'s 2017 review, Effective Teacher Professional Development, for the Learning Policy Institute.

Three recent narrower reviews are:

- Kraft, Blazar and Hogan's 2018 review of the literature on teacher coaching
- Popova et al.'s 2018 review of evidence around larger teacher PD programmes in developing countries
- Basma and Savage's 2018 review of teacher PD in literacy.

Two non-education reviews for comparison with other domains are:

- Cowpe et al.'s 2019 review of evidence around PD in medicine
- Salas et al.'s 2012 review of evidence around PD across all industries.

In order to carry out this comparison, I began with Cordingley et al.'s 2015 study, *Developing Great Teaching*. I identified key features and then proceeded to unearth these elements, or those similar in three later reviews (Kennedy, Mandaag et al. and Darling-Hammond et al.), only adding in further features if it was something that was completely absent from Cordingley et al. I proceeded on this same basis with the three narrower reviews. For the final two non-education reviews I simply looked for previously identified features within these papers.

There were two key areas in the non-education literature that seemed almost entirely absent in the education literature: use of online or blended learning and use of live or virtual simulations. There was some mention of this in Popova et al.'s study from the developing world but it seemed to be specified very differently to the non-education literature, preventing the drawing of any clear conclusions.

	General Reviews				Specific Reviews			Non-Education Reviews	
Feature	Cordingley et al. (2015)	Kennedy (2016)	Maandag et al. (2016)	Darling-Hammond et al. (2017)	Kraft, Blazar and Hogan (2018)	Popova et al. (2018)	Basma and Savage (2018)	Cowpe et al. (2019)	Salas et al. (2012)
Sustained engagement over several weeks/months	✓	~	✓	✓	~	(✓)	(x)1	✓	
Iterative: chance to apply in own classroom and reflect	✓		✓	✓	✓	✓		✓	✓
Structured collaboration around problem-solving, planning, observation, enquiry	✓	~	✓2	✓			(✓)	✓	
Relevance to practice and teacher goals	✓		✓	✓				✓	✓5
Differentiated by teacher stage/experience			(✓)7			✓			
Subject specific contextualisation	✓	~	✓	✓	✓	✓			
Ongoing formative assessment and focus on classroom work and data of impact	✓		✓					✓	✓
How pupils learn in this area	✓								
Theory as well as practice	✓	✓						✓	
Engage participants existing theories/ideas	✓			✓		(✓)		✓	
Challenge and raise expectations of what is possible and build self-efficacy	✓								✓
Teachers volunteer	~	✓	✓						~
External facilitation, expert in both content, pedagogy and PD	✓	✓	✓	✓	~			✓	
Challenge existing thinking and orthodoxy	✓								
Use of coaching and mentoring	✓	~	✓	✓	✓3	(✓)4	(✓)	✓	✓6
Use of modelling and exemplar material	✓	~	✓	✓				✓8	
Feedback to teachers	✓		✓	✓	✓		✓9	✓	✓
Encourage metacognition about participants' learning	✓								✓
Leaders create conditions for learning – time, culture, reducing other barriers/workload	✓		✓	(✓)	(✓)			✓	✓
Senior leaders become 'lead learners'	✓								
Leaders encourage buy-in and show relevance of PD to wider priorities	✓	✓		✓	(✓)	(✓)			✓
Linking PD to career progression						✓			
Providing aligned curriculum materials and tools				✓	✓	~			✓

Table 1: Comparing claims of features of effective professional development

Key:

✓ Supported

~ Questioned

x Opposed

( ) tentative or partial

Notes:

1. Programmes of less than 30 hours duration were more effective than those with 30+ hours, though this may be due to higher study quality in the shorter programme evaluations

2. "Experts model, coach and fade (as in cognitive apprenticeship) and teachers gradually and collaboratively focus on more teacher-directed change and enactment."

3. "we find that pairing coaching with group training is associated with 0.31 SD larger effect size on instruction and 0.12 SD larger effect size on achievement. Consistent with the theory of action outlined in Figure 1, this suggests that teachers may benefit from building baseline skills (e.g., content knowledge) prior to engaging directly with a coach. For instructional outcomes, pairing coaching with instructional resources and materials (e.g., curriculum) also is associated with greater gains (0.21 SD larger), while providing teachers with a video library is associated with more limited benefits (-0.27 SD smaller). We do not find any significant difference in effect sizes for coaching programs that were delivered in person or virtually, though our standard errors are too large to rule out even moderately sized differences"

4. Some evidence that coaching was effective only for inexperienced teachers

5. "prepare and encourage supervisors, mentors, and team leaders to have effective conversations with trainees prior to training. These individuals should be involved early in the needs assessment so that they understand the need for training and can provide accurate, motivating information about the training"

6. "[includes] the incorporation of errors, particularly when training complex cognitive tasks. Training tasks can be designed so that trainees are more likely to commit errors, and trainees can be encouraged to try new responses even if it leads to errors."

7. They find that there is no evidence that different PD models are appropriate at different career stages but they do find that the focus of the PD should be relevant to the developmental stage of the teacher

8. in relation to online training only "Clear online guidance should be in place, which is applicable to registrants and also to CPD providers. Of paramount importance is a dedicated online platform, including CPD tools relevant to the new scheme (e-portfolio, e- mentoring, clear instructions, recommendations, exemplar documents) where registrants can easily find guidance, upload their documentation and pose their questions or offer views" pp 57-58

9. in context of coaching

Table 1: Comparing claims of features of effective professional development

In Table 1, we can see a few features of effective professional development that seem most consistently identified across reviews:

- professional learning should be iterative, with opportunities to apply learning in real practice, reflect and improve over time
- professional learners should see the relevance of the training to their job requirements and to their professional goals and aspirations
- development should be designed with a focus on impact on students, with formative assessment built in for participants
- organisational leaders and facilitators need to create and protect the conditions for learning, e.g. time and space, while identifying and removing barriers such as workload
- organisational leaders should demonstrate and encourage alignment between PD and wider goals/approaches, actively encouraging and supporting the buy-in of participants.

There are then some features that most reviews identify as effective, while one review questions or challenges the evidence in each case:

- professional learners should engage in structured collaborative learning focused on problem-solving and enquiry
- professional learning is more effective when it has either an explicit focus on a specific subject area or where there are opportunities to translate generic ideas into a subject-specific context
- professional learning should be facilitated through coaching and mentoring, with opportunities for explicit modelling of skills (including live, video and written case studies), giving feedback on efforts
- PD facilitators and coaches should be experts in both the content and process of the PD, challenging internal orthodoxies and providing new perspectives where necessary
- PD is more effective when teachers are volunteers in the process rather than being conscripts.

Finally, there is one particularly contentious feature – that PD should be sustained with many hours of activity over a period of time – which is questioned in more than one review. Indeed, Basma et al.'s review tentatively suggests that shorter PD interventions appeared to have more impact, although this may have been due to shorter studies having higher methodological quality and sample size. Kennedy fails to find a robust relationship between programme intensity and outcomes, with Kraft et al. suggesting that the quality of interactions, rather than quantity, is of more importance. Nevertheless, this feature is frequently cited in accompanying literature and guidelines around professional development, such as England's Standard for Teachers' Professional Development.

There are a number of other features identified which are identified in fewer reviews:

- that PD is more effective when differentiated by teacher experience
- that PD is more effective when it explicitly includes information about how students learn within the relevant domain being addressed

- that effective PD should ensure that teachers can engage with both effective practices and the underlying theory of why they work
- that effective PD should engage and start from teachers' existing values and ideas
- that effective PD should explicitly aim to raise expectations of what is possible and should build teachers' sense of self-efficacy
- that effective PD should encourage teachers to think about their own learning – a focus on metacognition
- that organisational leaders should model effective learning and become visibly engaged in professional development
- that effective PD provides not only ideas but also curriculum resources and tools that have the ideas embedded within them.

Finally, Popova's review of large interventions in developing countries suggests that effective professional development in these contexts is linked to teachers' career progression.

Reflecting on the usefulness of a set of *key features*

Kennedy's (2016) review raises some interesting questions about whether it is reasonable to expect a diverse set of types, contexts and audiences of professional development to all share the same set of key features. It is self-evident that professional development can vary in a number of ways, including:

- different aims of the development, e.g. from simply informing about policy updates, through training in a procedure all the way through to transforming existing instinctive practice and thinking
- different organisational contexts, from small groups of teachers through to huge cohorts; from individuals within a diverse range of institutions to all individuals within a single institution; from socioeconomically deprived areas to more advantaged areas
- different subjects and domains of the development, whether generic pedagogy, subject-specific, student-need-specific (e.g. focused on a particular special educational need), technical (e.g. using a new computer system) or more competency/skill-based (e.g. leadership)
- different prior experience, self-confidence and engagement levels of participants
- different prior learning, determining whether ideas have to augment existing thinking or displace/override existing thinking, practice and habits.

It seems particularly unlikely that any one standard design of professional development would be appropriate nor indeed practical in all contexts. The above list perhaps also helps us identify why scaling professional development interventions can be so challenging: the further it scales the more the tension grows between fidelity to the original practices and ideas versus the need to adapt to new contexts, participants and challenges.

In particular, the last point – whether PD needs to be additive or disruptive – could have major implications given emerging understanding that prior thinking, practice and misconceptions can never be overridden but can easily re-emerge after a while, without very careful ongoing work to suppress them.

Where next?

There have been a number of reflections that the field of teacher professional development is somewhat lacking in thinking about underlying conceptual models and mechanisms (e.g. Kennedy, Mandaag et al., Fletcher-Wood and Sims). Perhaps the developing knowledge base about the cognitive science of learning may offer us a useful frame of reference for future studies and analysis. Similarly, with greater attention being paid to individual features of professional development and their suitability for different audiences, content and contexts, perhaps future studies may be better designed to test the efficacy of individual features in differing circumstances.

In the meantime, we have a plausibly helpful set of design principles expressed across a number of reviews about professional development. While no individual feature would seem to offer any guarantee of success, it seems like a good bet to stay focused on carefully designed programmes that align broadly with all of them until such time as a developing evidence base can offer us more granular and specific recommendations.

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EXTENDED CASE STUDY

Perspectives and evidence on effective CPD from Canada

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In this article, I discuss findings from *The State of Educators' Professional Learning in Canada* study funded by Learning Forward (Campbell et al., 2016 and 2017a). Attention to a high-quality teaching profession and to CPD is a key factor in the performance of Canada's education systems (Campbell et al., 2017b). As school education is the individual responsibility of 10 provinces and three territories, there had previously been a lack of Pan-Canadian evidence about the features of CPD within and across all of Canada.

What are the features of effective CPD?

We began our Canada study by reviewing what the existing international research literature suggested were the features of effective CPD. We identified three key components and 10 features of effective CPD (see Figure 1). In summary, effective CPD:

- has *quality content* that is evidence-informed, includes attention to subject-specific and pedagogical content knowledge, focuses on student outcomes, and considers a balance between teacher voice and system coherence in priority content;
- pays careful attention to *learning design and implementation* approaches that include a range of opportunities for active and varied CPD, collaborative learning experiences and job-embedded learning; and
- ensures attention to adequate *support and sustainability* from the outset, including sufficient time and duration of CPD, availability of resources, and supportive and engaged leadership in schools and at the system level.

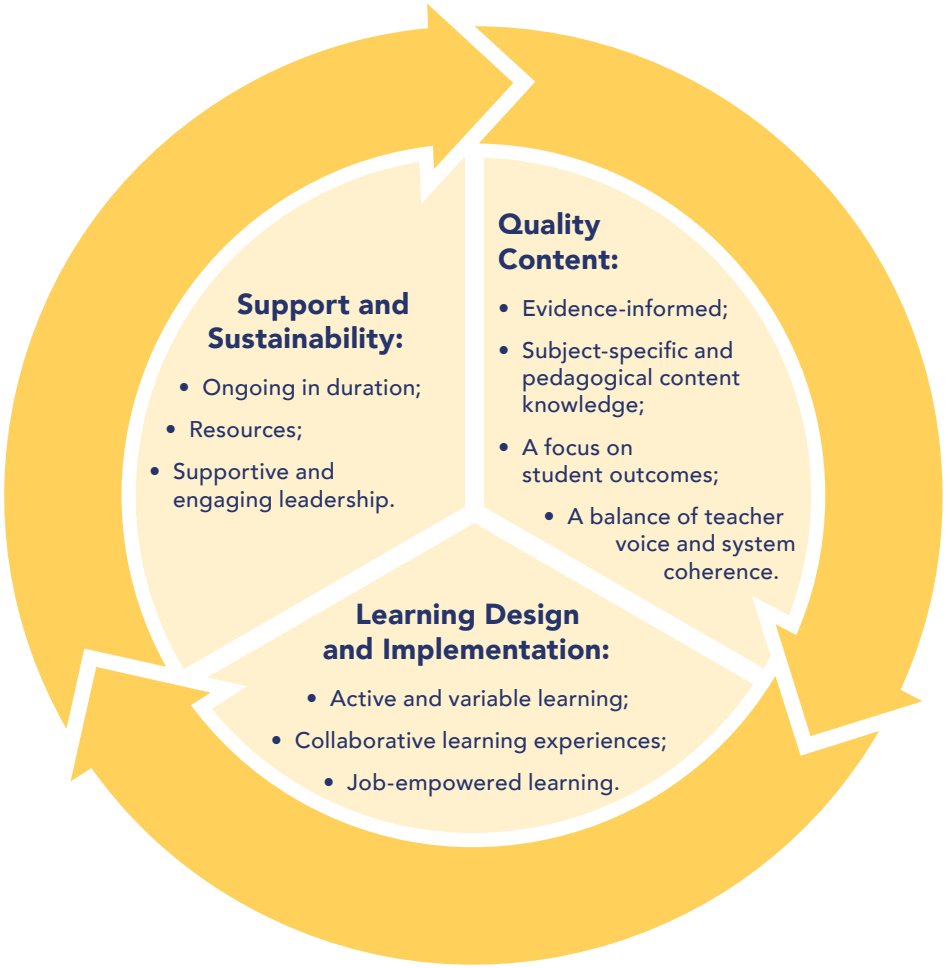

Figure 1: Key Research-Informed Features of Effective Professional Learning (Campbell et al., 2017a, p. 7). Used with permission of Learning Forward, www.learningforward.org. All rights reserved.

What is the state of educators' professional learning in Canada?

We found that the 10 key features of effective CPD we had identified from the international research literature were all present and important in Canada. However, each feature had some specific contextual differences and nuances within and across the diversity of provincial and territorial policies and practices, school communities and priorities, and teachers' professional experiences and specific needs linked to their students, classrooms, teaching assignments and careers. Table 1 outlines our revised 10 features of effective CPD specific to the findings from Canada.

1. Evidence, inquiry and professional judgement are informing professional learning policies and practices

Evidence-informed CPD involves drawing on a range of sources of evidence – research, data, classroom evidence and students' work – and attention to professional expertise, experiences, inquiry and judgement. Examples of evidence-informed approaches to CPD exist at all levels of the education system in Canada, for example in government and provincial organisations' policies and frameworks, in district and school level improvement planning priorities and in the day-to-day work and CPD activities of teachers, including opportunities for inquiry and engaging in and with research. For example in Alberta, Fort McMurray Public schools incorporated Professional Learning Fridays (PLFs) into the district calendar; 14 full days where teachers gathered together to collaborate and learn with and from one another. Of the 14 days, five were led by the district and the remaining nine were allocated to be used at school-level.

	Key Components and Features of Effective Professional Learning Identified in Review of Research Literature	Key Findings from Study of Educators' Professional Learning in Canada
Quality Content	Evidence-informed	Evidence, inquiry and professional judgement are informing professional learning policies and practices
	Subject-specific and pedagogical content knowledge	The priority area identified by teachers for developing their knowledge and practices is how to support diverse learners' needs
	A focus on student outcomes	A focus on a broad range of students' and professionals' learning outcomes is important
	A balance of teacher voice and system coherence	The appropriate balance of system-directed and self-directed professional development for teachers is complex and contested
Learning Design and Implementation	Active and variable learning	There is "no one size fits all" approach to professional learning; teachers are engaging in multiple opportunities for professional learning and inquiry with differentiation for their professional needs
	Collaborative learning experiences	Collaborative learning experiences are highly valued and prevalent within and across schools and wider professional networks
	Job-embedded learning	Teachers value professional learning that is relevant and practical for their work; "'job-embedded" should not mean school-based exclusively as opportunities to engage with external colleagues and learning opportunities matter also
Support and Sustainability	Ongoing in duration	Time for sustained, cumulative professional learning integrated within educators' work lives requires attention
	Resources	Inequitable variations in access to funding for teachers' self-selected professional development are problematic
	Supportive and engaged leadership	System and school leaders have important roles in supporting professional learning for teachers and for themselves

Table 1: Features of Professional Learning and Key Findings from State of Educators' Professional Learning in Canada Study (Source: Campbell et al., 2016, p. 8). Used with permission of Learning Forward, www.learningforward.org. All rights reserved.

2. The priority area identified by teachers for developing their knowledge and practices is how to support diverse learners' needs

Shulman (1986) identified the importance of teachers developing subject content knowledge, pedagogical content knowledge and curricular knowledge. A combination of subject, pedagogical and curricular knowledge is important in the Canadian context also. However, the particular professional development needs of a teacher varies for a range of personal, professional and educational reasons. In our survey in New Brunswick, 36% of respondents identified 'subject matter content' as the area of professional development *most* needed by teachers; whereas 34% of respondents identified subject matter content as the area of professional development *least* needed. The area of professional development identified as most needed was 'supporting diverse learning needs' (56% of respondents). Of particular importance, the need to support teachers' knowledge and understanding of Aboriginal people has been identified (CTF, 2015).

3. A focus on a broad range of students' and professionals' learning outcomes is important

Reviews of effective CPD have identified the need to have content focused on student outcomes (e.g. CUREE, 2012; Cordingley et al., 2015); this is also considered important in Canada. In our New Brunswick survey, we asked teachers to identify their priority professional needs linked to our ten principles of effective professional learning (see Figure 1): the majority of respondents (56%) selected a *focus on student outcomes* as the top priority. However, concerns were expressed that a focus on student outcomes should not be interpreted narrowly as test scores. For example, the *Changing Results for Young Readers (CR4YR)* initiative in British Columbia resulted in gains in student achievement and also increased student confidence, personal responsibility, motivation and self-regulation. Effective CPD needs also to include the benefits for professionals' learning outcomes, for example the *Collaborative Inquiry for Learning – Mathematics (CIL-M)* in Ontario recognised the need to support changes in teachers' efficacy, beliefs and practices before improving students' efficacy, expectancy and achievement for mathematics.

4. The appropriate balance of system-directed and self-directed professional development for teachers is complex and contested

Attending to an appropriate balance of teacher voice and choice in CPD, while also supporting system coherence connected to system and or school priorities and needs is important (e.g. see Jensen et al., 2016). Generally, a balance between CPD linked to overall system goals and also for teachers' specific needs was considered important in our Canada study too. For example, in Alberta, the *Teacher Growth, Supervision, and Evaluation Policy* requires all employed teachers to complete an annual growth plan that outlines learning goals and activities for the next year, these may include a combination of district, school-based, and self-selected learning experiences.

However, the appropriate balance between teacher voice and system coherence and issues concerning teachers' ability to exercise professional judgement over their own CPD was a major theme in our findings. Our New Brunswick survey revealed mixed experiences in terms of teacher autonomy for CPD over time: 36% of respondents reported less autonomy; 34% reported more autonomy; 16% reported continuing low autonomy; and 14% reported continuing high autonomy. A Canadian Teachers' Federation (CTF, 2014) survey indicated 64% of teachers were somewhat (34%) or significantly (30%) stressed by 'imposed professional development activities'. One successful example of balancing teacher voice and choice with system coherence was Ontario's Teacher Learning and Leadership where there is support from the government and teachers' unions for teachers to undertake their own self-directed CPD projects and to support other colleagues CPD (see Lieberman, Campbell and Yashkina, 2017).

5. There is 'no one size fits all' approach to professional learning; teachers are engaging in multiple opportunities for professional learning and inquiry with differentiation for their professional needs

Teachers need a wide variety of CPD opportunities to develop their knowledge, skills and practices over their careers. Teachers in Alberta reported one of the highest participation rates (98%) in CPD among the countries in TALIS (OECD, 2014). The findings from our Canada study were that the most frequently participated in forms of CPD were workshops and collaborative learning. Teachers appreciated the opportunities to collaborate with peers and engage in teacher-led workshops, and also to have to external expertise and sources of CPD. Overall, we concluded that 'there is no one size fits all' approach to professional learning and nor should there be.

6. Collaborative learning experiences are highly valued and prevalent within and across schools and wider professional networks

Collaborative learning experiences have been identified as very important (e.g. CUREE, 2012; Cordingley et al., 2015). In the Canada study, collaborative learning experiences were highly valued. In an Alberta survey, 80% of respondents reported 'collaboration with colleagues' as their best CPD (Beauchamp et al., 2014). Examples of collaborative

professional learning opportunities exist within and across all levels of the education systems in Canada: international, across and within provinces and territories, districts and schools, and school-based. For example, the Ontario English Catholic Teachers' Association (OECTA) supported *Collaborative Learning Communities* (CLCs) – in the words of one interviewee – 'to enable teachers to meet in groups to discuss mutual interests and concerns about teaching and learning'. Teachers were supported to submit applications on a wide range of topics linked to their CPD needs and their students' needs. Participants were highly positive about the opportunity to collaborate on a priority need that they had self-identified and then having the time and opportunity for shared dialogue, inquiry and learning with colleagues.

7. Teachers value professional learning that is relevant and practical for their work; ''job-embedded' should not mean exclusively school-based as opportunities to engage with external colleagues and learning opportunities also matter

According to Opfer, *non-school embedded* CPD involves activities that 'pull teachers out of their schools and classrooms in order for them to learn a new technique or skill' (Opfer, 2016, p. 12), whereas *school embedded* CPD includes activities within school such as collaborative research on problems of practices, peer observation and coaching. In our Canada study, a feature of effective CPD was that it was considered to be practical and relevant to teachers' need.

Induction and mentoring can be powerful forms of job-embedded CPD. However, only Ontario and the Northwest Territories require teachers to participate in a formal induction program. In our interviews, with mentors and mentees in Ontario's New Teacher Induction Program (NTIP), new teachers appreciated having mentors who could provide practical support for their teaching and learning in classrooms and also emotional support to provide advice and assurance. However, in most parts of Canada, induction and mentoring is a more informal process that takes a variety of forms including beginning teacher conferences and mentoring programs provided by professional associations individually and/or in collaboration with school districts and/or local universities.

Opportunities for peer coaching and feedback can also be valuable. For example, Dr Donald Massey School in Alberta paired teachers across grade levels and provided them with release time to participate in classroom observations and coaching sessions. However, peer mentoring or coaching is not yet a widespread practice. Observations and feedback by the school principal, often as part of an annual review, is more commonplace. In Alberta, 93% of teachers surveyed for TALIS responded that they received formal or informal feedback; for the majority of these teachers (81%) feedback was from their principal (Alberta Education, 2014).

Teachers in Canada said that they also benefited from relevant and practical learning beyond their own school. Our interviewees commented on the importance of expanding their professional networks and to gaining new ideas and resources from external sources, such as participating in conferences and workshops or undertaking further study and qualifications. Social media and online networking have become particularly important.

8. Time for sustained, cumulative professional learning integrated within educators' work lives requires attention

Darling-Hammond et al. (2009, p. 9) concluded that a minimum of 49 hours of CPD was required to impact student achievement and preferably this is sustained, cumulative learning over six to 12 months. In general, teachers across Canada spend an average of two hours during the work week on professional learning (which totals to approximately 76 hours during the school year). However, this can include time both within and outside the regular school day. In Prince Edward Island, of the 1.54 hours reported during weekday hours, 0.4 hours are during the school day and 1.14 hours are before or after the official school day (Macdonald et al., 2010). Concerns about time for collaborative CPD during the regular work week were clear in our study. In an Alberta survey, only 21% of

respondents reported time for professional learning communities during the normal school day (ATA, 2015).

Time for CPD needs to take account of workloads, working hours and work intensification pressures. Teachers in Canada report working approximately 55 hours a week. CPD cannot be layered on as more activities. The provision of dedicated CPD days is used and generally contained within collective agreements negotiated by teachers' unions – the number of negotiated CPD days has ranged from 20 days per school year in Quebec to 3 days in Newfoundland and in Saskatchewan (Bellini, 2014). There can also be a combination of system-wide CPD days and school-based CPD. For example, at Jasper Place High School in Alberta the regular monthly staff meeting was replaced with weekly professional learning meetings before school and five days from the regular school schedule were replaced by 'alternative learning opportunities' (ALOs), where teachers engage in their own action research projects and students have flexible learning and enrichment experiences.

9. Inequitable variations in access to funding for teachers' self-selected professional development are problematic

CPD requires adequate funding (Odden and Picus, 2014). Funding approaches vary within and between provinces and territories, often funds that become used for CPD were wrapped into a larger funding envelope for a particular initiative or priority, and districts and schools vary in how they allocate funds locally. Every teacher union in Canada has negotiated provisions for professional development in their collective agreements, including CPD funds. However, there was substantial variation in the level of CPD funding available to an individual teacher. We identified examples of teachers having access to CPD funding ranging from $75 to $2,500 per person. There were particular challenges of affordability of CPD for beginning teachers, teachers without a permanent contract, teachers who were currently unemployed, and teachers in rural and remote areas, and teachers in French-language schools.

10. System and school leaders have important roles in supporting professional learning for teachers and for themselves

Robinson et al.'s (2009) synthesis of *School Leadership and Student Outcomes* identified that the most impactful practice by school leaders is 'promoting and participating in teacher learning and development' (pp. 38–39). In Canada, system leaders (province, region, district) and school leaders are actively engaged in supporting CPD. Teachers appreciated this support, including championing teachers' learning and accomplishments, co-learning with staff, and facilitating a culture, plan and resources for CPD. However, for some teachers, formal leaders' attempts to lead and direct CPD was perceived as undermining teachers' own professional judgement.

Formal leaders also require their own CPD opportunities. For people seeking to move into formal leadership positions, there are required qualifications linked with CPD and professional standards associated with the principalship and superintendency in Canada. Once in a promoted position, school and system leaders also need – and can benefit from – all of the features of effective CPD discussed above. School leaders appreciated opportunities, such as the Leading Student Achievement (LSA) initiative in Ontario, that supported them to work in professional learning communities with other school leaders and with system leaders outside of their own school. Opportunities for coaching and mentoring were also desired, but not always available. As with the evidence previously discussed for teachers, formal leaders experienced challenges of time, workload and work intensification as obstacles to their own CPD, as well as obstacles to supporting staffs' CPD.

Conclusions

Ensuring educators have access to appropriate and effective CPD opportunities is essential. Existing inequities in funding, time and availability of quality CPD for all educators requires attention. There is growing consensus in the international (and the UK) research literature about the features of effective CPD that can guide decisions about CPD design, selection and provision. However, the specific details of CPD needed does – and should – vary in different local contexts, for different individual professionals' needs, priorities and experiences, and to best support the students to be served in their classrooms and schools.

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CASE STUDY

Sustained professional development to enhance assessment practice

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As educators, we sometimes believe that on-going professional learning for teachers is somehow a different paradigm altogether to 'pupil learning'. While the content-to-be-learned may be different, and the level of expertise of the learner, the processes the human brain uses to achieve its learning goals are largely the same. It is therefore somewhat ironic that the common approaches to teacher learning would never be adopted in the classroom to support pupil learning – a teacher wouldn't cover algebra in a single day talking to a set of PowerPoint slides, for example.

A well-developed programme of learning for teachers should be similar to the approaches used to help pupils learn: sustained over time with structured and sequenced opportunities for practice and recap, collaborative, and inclusive of expert support and guidance (Cordingley et al., 2015). However, this kind of professional learning is not usually cheap to develop and deliver and – as the saying goes, 'cheap work isn't good, and good work isn't cheap'!

Achieving the 'gold standard' in teacher professional development is possible but challenging, and rightly so. The development of high-quality professional learning requires a pragmatic approach and one that must try to balance the practicalities of investment and return, along with the desire to create and deliver a 'gold standard' model that is scalable so it is accessible to many schools – Professor Jonathan Sharples talks about this as the 'scale-up challenge' triangle (Sharples, 2017).

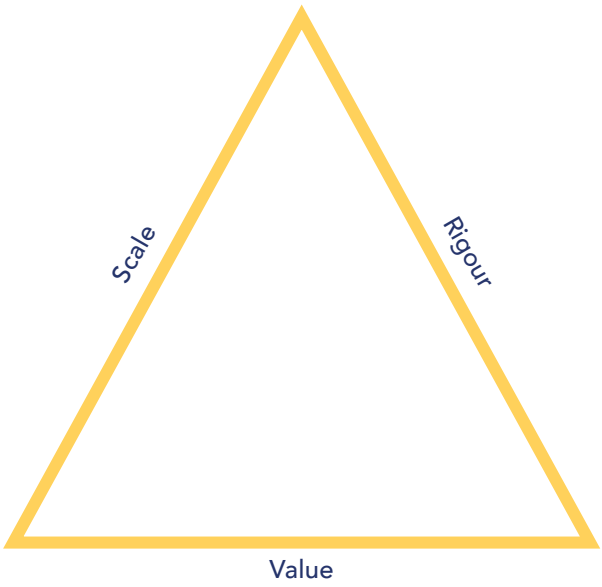

Figure 1: The Scale-Up Challenge Triangle

At Evidence Based Education, our core belief is that robust evidence is a fundamental component of teaching and learning. As an organisation committed to supporting schools in using good evidence, we do our utmost to practise what we preach. When designing and delivering high-quality training and support for schools, we draw upon the best available evidence in effective teacher learning, with the impact on learners at the forefront of our minds.

Professional learning that is accessible, high-quality in design and effective in implementation is the goal we set ourselves when designing the Assessment Lead Programme. The Assessment Lead Programme (ALP) is a web-based course of professional learning for middle and senior leaders to improve whole-school practice in using assessment as a pedagogical tool to support pupil learning and progress.

Armed with the theories of good assessment, informed by the best available evidence in teacher CPD and guided by the principles of behavioural insight, we designed and refined the programme content and resources as we went over a one-year pilot involving 21 brave teachers from seven schools. Naturally, what we first thought to be good needed more work and so we took an 'engage and iterate' approach, guided by the practical wisdom of teachers. After the one-year pilot, the next step was to pull together everything into what is now a framework of tools, resources, professional learning and support.

Somewhat of a revelation for us when creating the programme was the shift in emphasis on its component parts. While the learning component (principles of great assessment) is fundamental, just knowing key principles in theory would likely be ineffective unless teachers had the opportunity to put those principles to work in their own context. Furthermore, once the knowledge and skills had been acquired and practised, they still might not have a positive impact unless we provided guidance for implementing and sustaining them. Therefore, we created a flexible blueprint for leading the improvement of assessment within a department or phase, going as far as

to suggest how often colleagues in schools should meet and what the focus of each meeting could be. In short, the emphasis shifted from learning about assessment to being able to implement an effective assessment approach.

The best available evidence in teacher learning has informed the key features of the programme:

- 40+ hours of active professional learning, sustained over three school terms
- Practice opportunities and non-negotiable exercises to stage learning
- A minimum of two people per school, because we know professional development has more impact when people collaborate and support each other
- One of the two places should be filled by the school's senior leader responsible for assessment so that a change in practice is supported at senior leadership level
- Expert support and guidance throughout the programme from our team.

The evidence is clear on the characteristics of effective teacher professional development and how the balance of rigour, scale and value can be met. However, the culture shift required for providers to move away from one-off teacher training sessions needs to be demanded by teachers.

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Identifying evidence-based professional development: Programmes, forms and mechanisms

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Teachers vary widely in their ability to raise pupil attainment (Burgess, 2015). Consider a pupil, Sally, who begins secondary school in England with average maths abilities: 50% of the other pupils in her year are better than her at maths, 50% are worse. During secondary school, Sally and other pupils her age can expect to be taught by five different maths teachers, one in each academic year. Most pupils will experience a mix of good and less good teaching. However, some lucky pupils will experience a string of really effective teachers; while other less lucky pupils will encounter a string of less effective teachers.

For illustrative purposes, let's pick 100 pupils at random from across the country in Sally's year group. Then arrange them in order of how 'lucky' they have been in terms of the quality of maths teachers they encounter during their secondary school career. If Sally experiences similar quality teachers to the 16th luckiest pupil out of those 100, we would expect her to move from being better at maths than 50% of her fellow pupils, to being better at maths than 62% of her fellow pupils. If Sally is really fortunate, and experiences similar quality teachers to the 2nd luckiest pupil out of those 100, we would expect her to end up being better at maths than 74% of her fellow pupils.

The above example (based on Lee, 2018) shows that teachers' ability to help pupils learn varies dramatically. The challenge is therefore to improve the quality of teaching so that more pupils get access to good instruction. Teachers acquire new skills in a number of ways; through experience, through working with other high-quality teachers, and through participating in effective professional development (for a summary, see Allen and Sims, 2018). There are several ways in which policymakers and school leaders can try to affect teacher quality through the first two routes. However, they are arguably limited in scope. All school systems need to be continuously nurturing the next generation of trainee and early-career teachers. And some schools, or departments within them, might not have many great teachers to mentor the others. Effective professional development (PD) has the potential to be both scalable and portable, making it a particularly attractive route for improving teaching quality.

The difficulty is in understanding the apparently innocuous 'effective'. How do we know what is effective, as opposed to just plausible, interesting or enjoyable? How do policymakers choose which types of programmes to commission or scale up? How do research funders like the Education Endowment Foundation (EEF) in England know which types of interventions to test? And how do school leaders and teacher trainers know which types of PD to buy-in or develop in-house? In this article, we set out three different foci for identifying effective PD: programmes, forms and mechanisms. For each, we provide a definition, give examples, suggest specific evidential standards for identifying *what works*, and discuss the advantages and disadvantages of the approach. The article concludes with a discussion of the implications for policymakers, researchers and PD leaders.

Programmes

PD programmes are specific sets of activities and materials which have their own identity and tend to be located in, or associated with, specific people or institutions. By activities, we mean the actions and tasks teachers go through. And by materials, we mean the concrete stimuli and curricular resources that are provided for teachers. In well-established programmes, the activities are sometimes codified in a programme manual and the materials can sometimes be acquired off-the-shelf as part of a resource pack. These will often be subject to copyright, are therefore specific to the programme and tend to come under a brand name. The identity of the programme is often intertwined with the team that developed it, or the institution in which it is based.

The *Dialogic Teaching* programme, for example, aims to improve the way that teachers use discussion in the classroom (Alexander, 2017). It consists of a set of activities, including induction training, in-school mentoring, discussion of video and audio recordings of teaching, and planning and review activities. All of this is encapsulated in a 68-page handbook which describes what happens during each week of the course. The programme also provides teachers with materials, including the book on which the programme is based, proformas to support the planning and review sessions and a laminated sheet summarising the dialogic repertoires which the programme focuses on developing. The programme was developed by Robin Alexander at the University of Cambridge in England.

The specific and codified nature of PD programmes means they are often suitable for evaluation using experimental or quasi-experimental methods. This involves providing access to the programme for one 'treatment' group and denying it to another 'control' group, and then measuring the differences in outcomes between these two groups. Randomised controlled trials (RCTs) determine which teachers end up in the treatment or control group by, in essence, the flip of a coin. For the same reason that over many coin flips we would expect to get approximately 50% heads and 50% tails, RCTs ensure that teachers allocated to the treatment group have (approximately) identical characteristics to teachers allocated to the control group. Because the two groups have near-identical characteristics, any differences in outcomes are inferred to be the result of the one remaining difference between the two groups: receipt of the PD programme. The dialogic teaching programme has been evaluated using just this method and found to have a positive impact in science (Jay et al., 2017), equivalent to moving Sally from being better than 50% of her fellow pupils, to being better than 55% of her fellow pupils.

While the results of the Dialogic Teaching trial certainly provide support for its use in schools, we might want to hold off declaring it to be effective PD. Several PD programmes have shown positive results in initial RCTs only for larger, follow-up RCTs to find no impact. For example, Thinking, Doing, Talking Science achieved impressive results for an efficacy trial, with 41 schools (Hanley et al., 2015) but the impact on student learning disappeared when the same programme was re-tested in a larger RCT with 200 schools (Kitmitto et al., 2018).

There are at least two reasons this might happen. One is that when the programme is scaled up, the original developers have less influence and the programme becomes warped. Another is that the randomisation did a poor job at achieving balance.

Although we would always *expect* many coin tosses to result in approximately 50% heads and 50% tails, every now and then somebody will flip a sizable majority of heads. In trial terms, this might result in more of the motivated teachers ending up in the treatment group, for example. Better outcomes in the treatment group could now reflect either the impact of the programme or the effect of having more motivated teachers in the treatment group. We just don't know. For both reasons, replicating the results of trials is very important. Dialogic Teaching is currently undergoing just such a replication attempt. Other PD programmes that have shown positive evidence of impact in replicated RCTs include Reading Recovery (Sirinides et al., 2018), ABRACADABRA (Piquette et al., 2014) and My Teaching Partner (Allen et al., 2015).

A major advantage of examining the effectiveness of PD programmes (as opposed to forms or mechanisms) is that they are relatively unambiguous. It is clear what we are talking about when we discuss the Dialogic Teaching programme. Alexander's book explains the theory of the programme and the 61-page programme manual sets out the precise activities and materials involved. This is an important advantage given the ambiguity of language in the social sciences and the potential for misunderstanding. For example, two teachers might both experience 'coaching' PD, but in practice one might be experiencing instructional coaching and the other 'non-directive' coaching which bear little resemblance to each other. Despite this advantage, identifying effective PD programmes may not always be much help to school leaders and policy-makers. They may not be able to access effective programmes, for example because they are based in the US and are not available elsewhere. US programmes may also not translate effectively to schools in other countries (see, for example: Success for All; Miller et al., 2017). Even those that *are* already based in the same country can only expand so quickly, given the need to maintain fidelity to the programme design.

Forms

An alternative approach to trying to identify effective PD is to focus on forms. A form is a type or category of PD which is specified at a higher level of abstraction than a programme. Forms are defined by a set of characteristics: typical, identifying features. Unlike programmes, forms can accommodate variation in the specific materials and activities involved and are not uniquely associated with specific people or institutions.

Instructional coaching, for example, has been defined as "instructional experts work[ing] with teachers to discuss classroom practice in a way that is (a) individualized – coaching sessions are one-on-one; (b) intensive – coaches and teachers interact at least every couple of weeks; (c) sustained – teachers receive coaching over an extended period of time; (d) context specific – teachers are coached on their practices within the context of their own classroom; and (e) focused – coaches work with teachers to engage in deliberate practice of specific skills" (Kraft et al., 2018, p. 553). All PD programmes with these characteristics are examples of instructional coaching, regardless of other characteristics, such as the specific materials they employ or whether teachers receive additional training sessions. Examples include Content Focused Coaching (Matsumura et al., 2012) and the SIPIC programme (Sailors and Price, 2015).

A form cannot be evaluated in the same way as a programme. This is because, while you can allocate a teacher to receive a set of activities and materials that make up a programme, you cannot allocate them to receive a category of interventions. A more fruitful way to evaluate a form of CPD is to look at the evidence across many programmes of a particular form. Meta-analyses of RCTs or good quasi-experimental studies allow us to do this by answering two important questions. Firstly, do examples of the form work on average? Kraft et al. (2018) find that, on average, instructional coaching would have moved Sally from being better at maths than 50% of her year group to being better than 57% of them. Secondly, under what circumstances does it appear to work best? Kraft et al. (2018) show, for example, that combining coaching with group training and instructional resources was associated with larger impact. However, the amount of coaching provided was not.

Seeking effective *forms* of professional development has some advantages over seeking effective programmes. A form is more portable than a programme: it is

generally easier to design PD around characteristics than to reproduce a specific programme. Forms can also be adapted more easily to suit the needs of a particular school. However, knowing that a form of professional development is effective on average does not guarantee that a particular instance will work. For example, some forms of instructional coaching have not had the desired impact on student learning (e.g. Garet et al. 2011). Identifying effective forms also requires many good evaluations, whereas programmes can be established as effective (based on our proposal above) with as few as two studies. For example, instructional coaching is the only form of PD we know of to have demonstrated a positive effect from a meta-analysis of rigorous studies. Identifying effective forms will therefore take time.

Mechanisms

A third approach is to focus on identifying effective mechanisms. A mechanism is an 'active ingredient'; that is, it could not be removed from PD without making that PD less effective. Susan Michie and colleagues further define a mechanism as an 'observable, replicable and irreducible component of an intervention designed to alter or redirect causal processes that regulate behaviour' (Michie et al., 2013). 'Observable' implies that it is concrete as opposed to abstract. For example, being 'inspirational' is not observable. 'Replicable' implies that it could also be used in many contexts. Having a single celebrity speaker deliver part of a PD programme is arguably not replicable, for example, since they can only be in one place at a time. 'Irreducible' implies that it cannot be split into further constituent parts. This is intended to emphasise that mechanisms are basic building blocks. Finally, in the context of teacher PD, 'altering human behaviour' should be interpreted as changing teachers' practice.

Michie and her team have exhaustively identified ninety-three such mechanisms, organised in sixteen clusters. For example, Cluster 9, 'Goals and planning' covers nine specific mechanisms, including *planning of implementation* and *planned reviews of whether specific goals were achieved*. As well as giving examples of specific mechanisms, we can characterise PD programmes in terms of the interlocking set of mechanisms of which they are made up. For example, Content Focused Coaching (Matsumura et al., 2010) appears to consist of nine mechanisms, including: provide an observable example of a technique, provide communication from a credible source in favour of a technique, and prompting rehearsal of a specific technique.

While useful, Michie's taxonomy only provides a taxonomy of potentially effective mechanisms. The empirical evidence for the efficacy of each mechanism has not yet been established. Moreover, the value of a specific mechanism depends on the other mechanisms with which it is combined. For example, prompting rehearsal of a technique may not be of any use if the teacher has not been provided with an observable example of a technique. So, how can we identify which will be effective for PD? We have suggested elsewhere that this requires two types of evidence. Firstly, the mechanisms should have empirical evidence of being effective for changing practice across a range of contexts, including outside of education (Clarke et al., 2013). This increases our confidence that the mechanism is a genuinely reproducible, active ingredient. Secondly, the mechanism should appear in PD programmes or forms that have evidence of being effective. This increases our confidence that the mechanism can be combined with others to improve teachers' practice in particular.

An important advantage of mechanisms is that they can be deployed and combined in a flexible way. In addition, when the mechanisms behind an effective programme are accurately understood and specified, this can also help guard against a 'lethal mutation' – a variation which is no longer faithful to the underlying principles of the intervention (Brown and Campione, 1996, p.259). There are however, disadvantages to trying to identify effective mechanisms. As with forms, mechanisms leave the content of PD underspecified: they are more or less silent on *what* teachers should work on. More importantly, perhaps, they also have very high evidential standards. Understanding whether mechanisms work requires both evaluations of teacher PD programmes and evaluations from other contexts, as well as a good deal of interpretative effort to bring these together. The evidence base is not yet sufficient to confidently apply this approach in education, though research is developing rapidly.

Conclusion

In this article, we have set out three possible foci for identifying effective professional development: programmes, forms and mechanisms. In what remains, we summarise our discussion and draw out the implications of our three-part framework for school leaders, policymakers and research funders.

Programmes require the least amount of research to establish their effectiveness. However, the need for evidence from replicated RCTs (or high-quality quasi-experimental designs) is still high by absolute standards. The downside of focusing on programmes is that they remain inaccessible for many school leaders. This suggests an important role for research commissioners and policymakers in attracting such programmes to their own countries and/or funding their expansion, to make them more widely available. Training for school and PD leaders should also consider incorporating information about these programmes in their core modules.

Forms of PD benefit from being more portable than programmes. However, they require a large amount of research, preferably summarised in a good meta-analysis to establish their effectiveness. Even where this is available, it does not guarantee the effectiveness of a specific instance of the form. This suggests an important role for researchers in helping to investigate when and where effective forms are most likely to work for schools. Furthermore, school and PD leaders should consider investing in developing their own in-house capacity to deliver effective forms such as instructional coaching. Disciplined trial-and-error development of such approaches within schools is more likely to bear fruit than the adopting of other forms for which there is currently no good evidence of effectiveness.

Mechanisms benefit from the flexibility with which PD leaders can adopt and combine them to suit their own circumstances. In the long run, identifying effective mechanisms has the potential to empower PD leaders to develop their own bespoke approaches, while remaining evidence-based. PD leaders should also consider trying to identify the most likely mechanisms behind the PD they deliver, in order to try to clarify the active ingredients and avoid lethal mutations. Those developing PD might also consider which mechanisms they can incorporate in order to maximise the chances of improving practice. Having said this, the evidence in this area is at present underdeveloped. This suggests that research funders have an important role to play in synthesising the relevant evidence.

This discussion also highlights the value of moving up and down across the levels of the framework when discussing, designing, commissioning and evaluating CPD. For example, understanding the mechanisms behind a programme or looking to understand when forms appear to be effective, can help with the implementation of a specific programme. Despite their distinctive (dis)advantages, programmes, forms and mechanisms should therefore be considered complementary forms of evidence.

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CASE STUDY

Promoting and facilitating professional learning across an international school group through Nord Anglia University

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Nord Anglia Education (NAE) is a leading provider of international education, now with 66 schools in 29 countries and around 65,000 students and over 12,500 employees. As an organisation which strives to place learning right at the heart of everything it does, for every member of its community, the commitment to professional development retains the highest priority, and has to be ever-evolving to meet the needs of such a diverse and changing family membership with a very wide geographical spread.

As such, we build on the potential of technology for teacher professional learning (McAleavy et al., 2018) to facilitate our professional learning opportunities, complemented by face-to-face activity. Nord Anglia University (NAU) is the host for all NAE's professional learning opportunities and sits at the heart of our offer to staff.

The online platform combines multiple contributions from experts in the field, a large and growing video library, regular webinars on a range of teaching and learning topics, and a very wide range of online forums where colleagues can contribute and share ideas, building on the evidence for what makes effective online learning and collaboration for teachers (Lantz-Andersson et al., 2018). However, the majority of the site is very much written 'by teachers, for teachers', making use of a small and dedicated army of NAU Teaching Fellows who are recognised and assessed as leaders in their fields, which range from implementation of the United Nations Sustainable Development Goals to excellence in Early Years provision.

The face-to-face offer is largely, at this stage, focused on leadership. NAE provides company-wide programmes in middle leadership, senior leadership and an Aspiring Principals' Leadership programme, which has already been successful in growing the next generation of excellence in school leadership. We also work in partnership with King's College London, with the university delivering a unique, bespoke Masters in International Education for 50 colleagues each year from NAE. Current students on

this programme include teaching assistants, school administrators and NAE's Chief Executive and Chief Operating Officer as well as teachers.

There are clearly challenges in ensuring we maintain provision that makes a real difference to the lives of teachers, students and communities. In order to do this, a rigorous approach to evaluation is maintained on all programmes. This begins with usage statistics – the number of users, percentage of potential users, dwell time on the online platform, engagement at school and regional level – which are reported to the company's EXCO, Education Advisory Board and full Board on a monthly basis. In the past year, over 90% of NAE staff have made use of NAU and there have been over a million views of the site.

The second tier of evaluation is, again perhaps as expected, in terms of regular needs assessment and satisfaction surveys, especially using 'net promoter score' methodology. Although academic debate will continue about the usefulness of NPS, NAE has found it extremely helpful in giving headline satisfaction indicators, especially amongst teachers. All the NPS scores have remained consistently positive with time, with the senior leadership programme achieving an NPS of 100 for three years in a row.

As with all professional learning, however, the indicators that are the most beneficial in terms of evaluating the provision are those which define outcomes for colleagues, and ultimately for students. This is where the advantage of a large family of schools comes into its own. The NAE network of professional learning leads meet with each other regularly to assess the efficacy of the provision and also to assimilate the success of the professional learning offer in meeting the needs identified through performance management and review in their schools. Through this, the leads are better trained and equipped to support the staff development process, but they also act as a central feedback mechanism to enable the cycle of evaluation and review to be maintained.

The third facet, and the one which senior leaders at the company view as the most central, is the evaluation of the impact of professional learning on outcomes in the classroom, in terms of the quality of provision but most importantly the quality of student outcomes, personally, socially and academically. Three years ago, NAE adopted a new and rigorous Quality Assurance framework, based on best practice worldwide and using moderated and triangulated self-evaluation as its cornerstones. It is a statement of the obvious to say that schools should know themselves best, but NAE's central education team see their role as very much to provide the tools to enhance the quality of this self-knowledge and to act as a true critical friend against which to test the evaluation.

The framework had five sections, each with their own scaffolding for evaluating impact. 'An ambitious approach to learning for all students and adults' is a pivotal section (alongside 'Purpose and Direction'; 'Learning successes for students'; 'Educationally powerful partnerships and collaborations' and 'Leadership for continuous improvement through high-quality self-evaluation') including as it does an evaluation of the impact of professional learning and development for all colleagues.

There is still work to be done, but we believe that the way the team triangulates all aspects of the review process with parent, student and staff surveys and all other available data, on a cyclical and transparent basis, lays an excellent foundation.

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Quality assurance in teacher professional development

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The approach to, and rationale for the model of quality assurance of teacher professional development we present here, was carried out as part of a larger study funded by the Wellcome Trust and the Education Endowment Foundation, delivered in partnership with the Chartered College of Teaching and the Teacher Development Trust. The full rapid evidence review is available for download on the Wellcome Trust's website.

Introduction

There is an international consensus that teacher professional development is important. The majority of teachers participating in the TALIS study (OECD, 2019) report engagement in professional development. Characteristic features of effective professional development have been identified (for example, Cordingley et al., 2015) but there has been less focus on generating a broader understanding of quality in professional development or how to ensure that this occurs. However, given that professional development is significant in educational improvement and that teachers continue to report that the professional development they experience does not meet their needs (OECD, 2009; 2019), understanding quality is important.

We present here a framework of quality assurance to consider these issues. The concept of quality assurance in relation to professional development may be problematic in some respects. Ideas of quality assurance can be embedded in discourses of accountability and performativity. The purpose of quality assurance of professional development is not always clearly defined, and the lines between improvement and accountability are often blurred (Stensaker, 2008). Furthermore, as we describe below, some education systems which have a variety of mechanisms for realising and maintaining high quality professional development, do not describe this in the language of quality assurance. Here, we implement the term with the commonly-used meaning of maintaining a desired level of quality of, in this case, professional development.

Figure 1: Locating quality assurance of professional development within wider systems and contexts

Firstly, we present a model for the analysis of professional development that is the outcome of a wider review of literature and evidence (Perry, Boylan and Booth, 2019). We follow this by illustrating the model in relation to examples of systems of quality assurance of professional development in professions other than teaching. Next, we look at international examples of how quality in professional development is fostered in a variety of countries and, taking England as an example, consider other approaches to assuring quality in educational contexts. This leads to the proposal that two different approaches are found to support quality assurance: kite-marking and professional recognition.

A model of quality assurance in professional development

The context within which quality assurance operates has an influence on, and is influenced by, the functions, purposes and outcomes of the wider system (Figure 1). This model shows the influence of the wider social and professional system of teaching, the systems of professional development which exist in the teaching system, and at the centre, influenced by all those, the purpose, processes, costs and benefits of quality assurance itself.

This model highlights the importance of the interactions between system and context. For example, as we describe below, in some high-performing education systems, quality assurance is assumed because the wider professional system contains embedded assumptions of quality. In some other professions, professionals have a requirement to participate in professional development and a professional body which manages and controls quality assurance. In some professional development systems, wider marketisation may push institutions towards systems which appear to have recognised value in the 'marketplace'. It is vital that in considering the quality assurance of professional development, we recognise the impact of the context within which it exists.

Quality assurance of professional development in other professions

The professionalisation of teaching is still ongoing and, in many education systems, contested. It is instructive, therefore, to consider how other professions ensure the quality of professional development. We look here at some examples from professions in England.

In nursing and midwifery, the Nursing and Midwifery Council works with an external delivery partner to quality assure all stages of pre- and post-qualification education for nurses and midwives (Nursing and Midwifery Council, 2018). This includes the production and evaluation of evidence, including mapping of content against a standards framework and approval visits by quality assurance staff. Programmes are then approved indefinitely, with ongoing monitoring.

Dental professionals in England are individually responsible for ensuring that they get advance assurances about the quality of the professional development they choose. To support this, they are able to draw on advice provided by the professional body, the General Dental Council (GDC) (General Dental Council, 2018). The GDC also provides guidelines to professional development providers around how to ensure that their provision is of acceptable quality; in effect, allowing providers to quality assure their own provision (General Dental Council, 2017).

Members of the Royal College of Surgeons (RCS)have similarly individual responsibility. This sits alongside the expectation that they complete at least fifty hours of professional development each year; select professional development that is developmental and relevant to their skills, knowledge and career development; balance their professional development between clinical, academic and professional areas; and record their professional development activity, including reflections on learning. In order for professional development to count against the required hours, the professional development activity, centre, or provider must be accredited by the RCS (Royal College of Surgeons, 2019).

In some professions, there has been consideration of international models of accreditation of professional development. For example, in dentistry, the provision of uniformly quality assured professional development provision by European dental schools and other professional development providers, along with a pan-European system of professional development credits, may ensure better quality control of dentistry standards (Soumalainen et al., 2013). In Library Information Services, internationalisation of information professional qualifications is taking place (Tammaro, 2005). Finally, in relation to medicine, the European Union of Medical Specialists established the European Accreditation Council for Continuing Medical Education (EACCME) in 2000 (Varetto and Costa, 2013) to connect accreditation systems across Europe. While the EACCME does not itself accredit the provision of continuing education, it awards and validates the credits recommended by expert reviewers in member countries, thereby allowing the transfer of credits across countries.

Quality assurance of teacher professional development in international education systems

Internationally, a range of structures and processes exist for the monitoring and quality assurance of teachers' professional development. These include accreditation by professional bodies, monitoring of quality and market regulation.

In some systems, accreditation of professional development is undertaken by professional bodies, similar to the other professions described above. For example, in Ontario, accreditation of additional teacher qualifications is regulated by law at provincial level and undertaken through the Registrar office of the Ontario College of Teachers. Providers are required to have internal systems for quality assurance and improvement and a key feature is that the content 'makes appropriate provision for the application of theory in practice' (Ontario, 2016). Learning materials, course content and the qualifications and experience of the educators teaching the program are

assessed and lead to registration for a maximum of five years and then are subject to reregistration.

The extent of quality assurance may be linked to the level of marketisation in the system. For example, recent policy changes in New Zealand exemplify a government-regulated market. For centrally-funded professional learning and development (PLD), providers register by completion of a short form detailing their expertise and PLD offer to schools. Schools select from accredited providers and develop a PLD plan. If this is approved by the Ministry of Education then a contract for work is issued. While it appears that schools determine their own needs and identify ways to address them, in practice this is not necessarily the case, and the model has led to concerns being raised about the Ministry influencing schools' choice of PLD.

Finally, as we have mentioned earlier, in many comparatively high-performing education systems, quality assurance of professional development is not subject to any formal process. In such jurisdictions, the discourses of 'quality' and 'quality assurance' are often absent. Instead, it appears that the quality of professional development is assumed because some or all of the following apply:

- professional development is embedded in school and teacher practices and, as an ongoing aspect of practice, is subject to more general quality assurance processes (for example, in Japan)
- professional development is connected to formally recognised hierarchies in the teaching profession: the focus is on the recognition of teachers as experts rather on the professional development (for example, Shanghai's 'master teachers')
- funded professional development is provided by local or national government bodies with internal systems for improvement of practice and quality assurance (for example, in Singapore, where there is a close relationship between the Ministry of Education, the university that provides initial teacher education and professional development, and a national professional body)
- quality of professional development is assured through in-depth training (for example, Finland, with a system of university teaching schools)
- quality assurance of professional development is embedded in broader regulation of professional education (for example, in Switzerland, legal requirements for continuing education and training in general necessitate a close relationship between the Swiss Confederation, canton regional governing bodies and professional bodies (Swiss Confederation, 2018).

Quality assurance of teachers' professional development in England

In England, there is no widely used system of quality assurance of teachers' professional development and, unlike in other education jurisdictions and other professions, no government regulation or professional body which accredits professional development. However, there are national and local schemes of quality assurance.

In English education, external quality assurance – equivalent to that carried out by professional bodies in other countries and other professions – is often offered by subject associations or other special interest groups. These frequently have a wider remit than just quality assurance. For example, the purpose of the Association for Physical Education (AfPE) is to 'promote and maintain high standards and safe practice in all aspects and at all levels of physical education, school sport and physical activity' (AfPE, 2018). The AfPE has a Professional Development Board to quality assure providers' professional development.

The process of external quality assurance often includes self-assessment by the provider against a set of criteria determined by the quality assuring organisation, which may be supported by free or paid-for consultancy, or through membership subscriptions. The submission is then reviewed by an assessor. Often there is a single level of accreditation and support is rarely offered for application or improvement. The quality assuring organisations are also often providers of professional development in their own right. For example, the National Centre for Excellence in the Teaching of Mathematics (NCETM), which administers the NCETM CPD Standard (NCETM, 2017), also offers its own professional development to teachers and school leaders in mathematics.

In all external quality assurance systems, the criteria for assessment are set by the quality assuring organisation. This raises questions as to how criteria are agreed and how useful they are for the provider. A study of the AfPE's Professional Development board found that, while they found the process of reviewing their provision against externally-set standards informative and awareness-raising, providers felt that the process should be developmental rather than judgemental (Keay and Lloyd, 2009). This study also raised the issue of commerciality and competition between providers, which may point to one reason for the apparently low take-up of external systems of quality assurance.

In England, we also find examples of internal quality assurance, by which a provider employs processes to quality assure its own offer. Internal quality assurance processes may involve reviews of programme materials, evaluation of impact and/or, most commonly, training of programme facilitators. These programmes aim to support facilitators in understanding how to deliver effective professional development, including content such as strategies for working with adult learners, research evidence, and organisation-specific aims, structures and processes (STEM Learning Ltd, 2015; NASBTT, 2018). In some cases, training is followed by a quality assurance visit to observe the facilitator in action and provide feedback. For some organisations, facilitator training requires payment of a fee. For others it is funded by the organisation itself.

The overall purpose and effect of these quality assurance schemes, both internal and external, is often unclear. They may be intended to regulate what provision is available, to offer models of improvement and/or to assess existing provision.

Quality assurance of other aspects of education

Finally, we look beyond professional development to a different type of quality assurance: quality marking. Quality marks, such as the Primary Science Quality Mark (White et al., 2016), the Inclusion Quality Mark (IQM, 2018) and Artsmark (Artsmark, 2018) in England, may be applied to whole school policies, to specific aspects of practice and/or to individual subject areas. The aims of quality marks are generally to work towards one or more of:

- raising the profile of the quality mark's area of focus
- recognising and rewarding good practice
- providing a framework for improvement.

As with the external quality assurance processes described above, the standards and criteria against which schools assess themselves in order to achieve the quality mark are set by the administering organisation. Achieving or working towards them necessarily steers schools' practice towards a particular approach to the area of interest. The organisation running the quality mark may provide opportunities for practitioner and school-level professional development as part of the quality assurance system.

It appears that little external scrutiny is given to standards of quality; rather the administering organisations are trusted within the system to set and make judgements against them. This lack of scrutiny, which is reflected in quality assurance relating to

	Kite-marking	Professional recognition
Purpose	Meeting of minimum quality standards	Regulation of provision again minimum standards
Features	High volume, low cost, potentially wide coverage, often offer kite-marks at varying levels of quality	Accreditation of programmes of professional development which lead to recognition for participants
Costs and benefits	Low cost; Accreditation is of varying value to providers and participants; Process is often perceived as developmental	Often expensive; accreditation is of high value to providers and participants
Typical process	External and/or peer review of evidence portfolio	External review
Criteria used for quality assurance	Set by quality assuring organisation, against evidence of quality within area of focus	Set by quality assuring organisation, often against professional standards
Typical process	Often focussed on provider/facilitator; Approval through peer- or external-assessor review process	Focus usually on programme content/ delivery rather than provider; Approval through review of documentation, possible observation, peer- or external-assessor review process
Impacts	No market regulation; Potential for awareness-raising, influence and improvement within area of particular interest	Regulates the market of provision; Potential for influence and improvement on profession as a whole

Table 1: Approaches to quality assurance: kite-marking and professional recognition

some other professions (see, for example, Tammaro, 2005), may raise questions over the quality of evidence behind the assessed standards, their validity as judgements of effective practice, and whether achieving some standards might have unintentional (positive or negative) effects on other areas of school practice.

Two approaches to quality assurance

Considering the quality assurance of professional development in other professions and internationally, and the differing models of quality assurance currently in operation in England, leads us to suggest that there are two broad approaches to quality assurance: kite-marking and professional recognition (Table 1).

Within each approach there are different purposes, features and possibilities for how quality assurance operates, the processes used and – importantly – the drivers for its use and function. In kite-marking, provision is assessed against a set of minimum

standards, which may be 'stepped' to show progression routes for improvement. Kite-marking approaches may have external, internal and/or peer-assessment. Meanwhile, in professional recognition, provision is regulated with the effect that only certain providers are able to operate in the system. Users of the provision receive recognition for their participation and quality assurance is often carried out through external assessment against standards.

Earlier, we described how quality assurance systems operate within the wider systems of professional development and education. We end by concluding that the choice of which approach to quality assurance is appropriate for any particular system needs to take into account not just the practicalities of the different approaches described here, but also a consideration of how they will function within, and interact with, the wider system contexts.

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Mentoring, coaching and deliberate practice

04

Coaching and mentoring for teacher development: An overview of research and practice

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As a means of supporting and developing teachers, both mentoring and coaching have been a common feature in professional development for decades, rising in popularity following Joyce and Shower's (1982) research demonstrating the efficacy of a coaching approach for teachers. Now, mentoring and coaching approaches are regularly utilised, both within schools – for example experienced teachers mentoring new teachers – and as a feature of external professional development courses. In a survey of 1,440 teachers, the National Foundation for Educational Research (NFER) found that 'the majority… have been or are involved in mentoring or coaching in some form' (Lord et al., 2008).

The two distinct models of mentoring and coaching seem to be continuing to grow in popularity. For example, mentoring for teachers has recently been recognised by the Department for Education (DfE) as a crucial aspect of early career teacher support, reflected in the publication of the Early Career Framework (ECF) – a 'fully-funded, two-year package of structured training and support for early career teachers, linked to the best available research evidence' (DfE, 2019). The support package on offer will have mentoring at its heart, including providing funding and training for mentors in order that they have the skills and time to undertake this important role effectively. At the same time, instructional coaching, a form of teacher coaching explored in greater detail later in this article, is gaining traction across the education sector because of the quality and extent of research that demonstrates that it can have an impact on pupil attainment (Kraft et al., 2018). It is also becoming more common to see schools and providers implementing instructional coaching approaches into their professional development offers.

The prevalence of mentoring and coaching both within school and on external programmes also provides a useful indication that the profession sees value in their use. Both are types of teacher professional development and, typically, are intended to improve the skills, knowledge, wellbeing or practice of the teacher and, through this, ultimately improve the quality of education on offer to pupils. Therefore, it is useful to reflect briefly on the characteristics of effective professional development. Whilst there have been challenges to the consensus view (see Sims and Fletcher-Wood, 2018) there is nonetheless convergence around the Standard for Teacher's

Professional Development, which states that:

01 Professional development should have a focus on improving and evaluating pupil outcomes.

02 Professional development should be underpinned by robust evidence and expertise.

03 Professional development should include collaboration and expert challenge.

04 Professional development programmes should be sustained over time.

And all this is underpinned by, and requires that:

05 Professional development must be prioritised by school leadership. (DfE, 2016)

It might be reasonable to assume that mentoring and coaching approaches would, by design, meet these standards. For example, both are typically sustained over time, with relationships lasting for several terms. The mentor or coach play a collaborative role, working with the teacher to support them; and the use of feedback in both models provides expert challenge, with the coach / mentor often being in that role because of their expertise in teaching. Available evidence supports this notion, showing that mentoring and coaching approaches can be effective in supporting teachers to develop across a range of areas. However, it is important to acknowledge that whilst they *can* be an impactful form of teacher development (Ingersoll and Strong, 2011; Lord et al., 2008; Kraft et al., 2018) they are not always effective (Blazar and Kraft, 2015), can be of variable quality (Lofthouse et al., 2010) and at times can even be harmful (Hobson and Malderez, 2013).

As has often been the case with professional development (Yoon et al., 2007) it can also be difficult to find high-quality research about the impact of mentoring and coaching, and in particular which features are the active ingredients of any given programme. Similarly, it can be difficult to evaluate the effectiveness of coaching and mentoring programmes. For example, Hobson et al. (2009) note that research on mentoring has often focused on accounts of practice, which can lack reliability and validity. However, with the growing focus on quality educational research there has also been a growth of interesting studies that are starting to unwrap how and why different programmes are effective. Sims (2018) describes instructional coaching as the 'best evidenced form of teacher CPD' because of the range of high-quality evidence including from randomised controlled trials (RCTs), meta-analysis, A-B testing and systematic research programmes indicating its effectiveness. Despite this, there are a number of areas where the evidence base could be stronger.. This article aims to reflect on some of the benefits and challenges of using coaching and mentoring approaches to teacher development, some effective (and ineffective) approaches, and areas where further evidence might be needed.

What are the differences between mentoring and coaching?

There are not only a variety of approaches to both mentoring and coaching across the sector, but also a range of perspectives as to exactly what mentoring and coaching are and what defines them. There are some similarities between mentoring and coaching; they are often (unhelpfully) confused or considered to be synonymous or as being at two ends of a continuum. However, whilst there are some skills that an effective mentor or coach might have in common – such as giving feedback, listening and building rapport – mentoring and coaching should be seen as different, but interrelated approaches.

Mentoring relationships are generally seen as 'expert-novice' relationships (Hobson et al., 2009), where an expert mentor shares their experience, knowledge and skills

with a less experienced 'apprentice'. For most teachers, this begins during their Initial Teacher Training (ITT) and continues through their formative years as a teacher. As well as being supported to learn the skills of teaching, mentoring can often take on a pastoral role and is also a mechanism for inducting new teachers into their role, their school and the wider profession (Shanks, 2017; Hobson, 2016). Whilst this article will focus on the mentoring of teachers, it is worth nothing that it is also common in job transitions, such as when a teacher moves into their first middle or senior leadership position. Mentoring therefore typically requires context-specific expertise and utilises this expertise to support the teacher or leader to take on their new role.

Coaching, meanwhile, is often thought of in terms of executive coaching models. This is influenced heavily by the business world, where executive coaching is a popular industry. Often, this type of coaching is 'facilitative coaching' (Knight, 2018) where a coach will use questioning to draw out the expertise within the coachee, empowering them to make their own decisions about their next steps. In this model, the expertise required to know the best course of action is understood to be already held by the coachee and therefore the role of coach may require less context-specific expertise. In comparison to a mentoring relationship, the coach is likely to be expected to offer less advice and guidance. This type of coaching is particularly common in education for those in leadership roles – it is a selling point of many leadership development programmes to include external coaches.

Whilst this type of coaching has an important place in teacher and leader development, this article will focus on a model of teacher coaching. In this approach, the coach will 'observe teachers' instruction and provide feedback to help them improve in a way that is 'individualized, time-intensive, sustained… context-specific, and focused on discrete skills' (Kraft et al., 2018). This is often referred to as 'instructional coaching' and has more in common with sports coaching than executive coaching. In a 'dialogic' coaching relationship (Knight, 2018) the teacher and their coach work together in partnership through cycles of practise and evaluation of specific skills. Throughout, the teacher will be observed practising and provided with specific and detailed feedback. In this type of relationship, the coach requires expert knowledge of teaching in order to be able to provide useful, targeted feedback.

Teacher mentoring

As already outlined, teacher mentoring can be understood as a relationship between a novice and an expert teacher, where the expert supports the novice to develop their practice. Typically, mentoring relationships have a pastoral element and for new teachers, the mentor also helps the teacher to assimilate into role, school and the profession (Hobson and Malderez, 2013). When delivered effectively, mentoring can have an impact on a range of areas, including:

- improving teacher effectiveness (Goldhaber et al., 2018);
- increasing teacher wellbeing (Lord et al., 2008);
- developing specific teaching practices (Ingersoll and Strong, 2011);
- increasing teacher's commitment to professional development (Lord et al., 2008);
- retaining teachers in the profession (Ingersoll and Strong, 2011);
- raising student achievement (Ingersoll and Strong, 2011);
- developing the behaviours and skills needed for teachers to succeed in their role, such as increased reflectivity, time-management and behaviour management (Hobson et al., 2009; Lord et al., 2008).

However, not all mentoring is equally effective and at times it can even be harmful. Hobson and Malderez (2013) have coined the term 'judgementoring' to define a type of mentoring which can actively harm a teacher's development. In this type of mentoring relationship, the mentor makes the teacher feel 'judged' and 'evaluated'. This results in the teacher 'being reluctant to seek the support of a mentor… refraining from being open and honest with mentors about their perceived PLD needs… [and] avoiding forms of behaviour and interaction that they fear may draw attention to perceived weaknesses in their teaching capability or gaps in their knowledge' (Hobson, 2016). It may also negatively affect a teacher's wellbeing and desire to remain in the profession. Of course, it is important that when teacher mentoring is implemented it is done so in a way where the teacher feels supported and able to develop. The following list is not conclusive or comprehensive, but provides a useful starting point as to some of the features of an effective mentoring relationship:

- **Training for mentors:** Training does not always appear to be provided as standard for those acting as in-school mentors (Lord et al., 2008). However, effective training is important in ensuring that they have the requisite skills and do not fall into the trap of 'judgementoring' (Hobson and Malderez, 2013). Training also provides a valuable opportunity to ensure that mentors are clear about effective mentoring strategies (e.g. feedback, challenge, etc.) and when and how to use these. In larger-scale programmes, this might also be an opportunity to create consistency across a pool of mentors. There is also benefit to the mentor, as trained mentors might see more impact on their own development (Lord et al., 2008).

- **Resources and structures:** Teacher mentoring is neither quick nor easy to implement and this should be recognised in how it is resourced and managed. Mentors and teachers need enough time to spend with one another and can benefit from reduced timetables (Hobson, 2009; Lord et al., 2008; Ingersoll and Strong, 2011). In addition to this, mentoring benefits from established quality assurance and monitoring systems and from a clearly defined focus (Lord et al., 2008). It can be useful to have a 'mentor coordinator' who takes responsibility for overseeing how the programme is managed (Hobson, 2016).

- **Mentor selection and matching:** The role of the mentor is a very important one and it can be beneficial to select potential mentors carefully to ensure that they have the right skills and attributes. One study found a relationship between the effectiveness of the mentor and the teacher's effectiveness in maths, suggesting that selecting the most effective teachers to be mentors might have some value (Goldhaber et al., 2018). Once selected, the matching of mentors to teachers should be carried out appropriately (Hobson, 2016).

- **School culture:** School culture significantly affects the extent to which teachers' effectiveness develops over time (Kraft and Papay, 2014) and mentoring can be more effective when a school culture is collegial, values learning and provides further development and support for both the mentor and teacher outside of the mentoring relationship (Hobson et al., 2009). Implementing mentoring (and coaching) approaches can also positively affect the wider school culture (Lord et al., 2008).

- **Mentee willingness to learn:** The attitude of the mentee can affect the success of the mentoring relationship, and in a more effective relationship the mentee is open to their mentor and the mentoring and is willing to learn (Hobson, 2016). Hobson et al. suggest that an area where further research would add value would be in relation to 'how far, and by what means, mentees' 'willingness' to be mentored can be increased' (Hobson et al., 2009).

- **The relationship between teacher and mentor:** The quality of the mentoring relationship is central to the success of the mentoring itself. 'Relational trust' is important (Hobson, 2016), as it allows the mentee to be honest and open about their progress and areas of development. There can be a tension when the mentor is providing professional development and support through the mentoring role but is simultaneously providing formal evaluation or assessment as, for example, their line manager or induction tutor. An implication of judgement or evaluation can negatively impact the mentoring relationship (Hobson and Malderez, 2013). However, a study by Yusko and Feiman-Nemser indicated that whilst it is challenging 'assistance and assessment can coexist' (2018).

- **Mentoring strategies:** As might be expected, the strategies employed by the mentor are important (Hobson, 2009). For example, the mentor has a role to ensure that the teacher has ownership over any goals, and that those goals are clearly understood.

Teacher coaching

Instructional coaching for teachers, as previously defined, is supported by high-quality evidence as to its efficacy. It has been shown to have a positive effect on a range of measures, including:

- teacher's instructional practices (Kraft et al., 2018);
- the quality of teacher-child interactions (Allen et al., 2011);
- pupil behaviour and motivation (Allen et al., 2015)
- pupil attainment (Kraft et al., 2018; Basma and Savage, 2018; Allen et al., 2011; Allen et al., 2015).

These coaching programmes tend to have some common features which are likely to contribute to their effectiveness. These include the coach observing the teacher and providing feedback; the teacher and coach setting narrow goals that are focused on improving specific practices; the coach observing the teacher practising these skills and providing feedback; and this continuing through several cycles of improvement.

Whilst there are some common principles, there is still a considerable amount of disparity in *how* coaching is delivered. Some programmes are supported by detailed rubrics intended to de demonstrate good practice and some have video libraries serving a similar purpose. Some programmes rely on in-person observation whilst others use technology to record lessons and hold coaching conversations over the phone or online. There is variety in the length and intensity of the coaching, and how coaches and participants are selected to take part and what training they are provided with. Whilst more research into the efficacy of different programme elements would undoubtedly be useful, there are studies that provide some interesting indications about what some important features might be. This includes:

- **Coach quality:** Blazar and Kraft (2015) conducted a randomised control trial (RCT) that attempted to isolate the design features of a coaching programme that made it effective. They found that individual coaches had very different effects, which were unlikely to be affected by other changes to the programme, such as coach training or dosage. Whilst this does not specify the individual qualities of the coach that make a difference, it is useful to understand how vital the individual coach seems to be to the success of the programme. Kraft et al. similarly found that the '*quality* and focus of coaching may be more important than the actual number of contact hours' (2018). It is interesting that they found the dosage of coaching was less important than we might anticipate and a useful area of further research would be to determine how much coaching is optimal.

- **Focus of the coaching:** As indicated above, alongside coach quality the focus of the coaching appears to be important (Kraft et al., 2018; Kraft, 2015). Again, further research on which focus areas were more or less impactful would add value to the field.

- **Additional training for teachers:** Kraft et al. found that 'pairing coaching with group training is associated with 0.31 SD larger effect size on instruction and 0.12 SD larger effect size on achievement' (2018), suggesting that there may be benefit to ensuring that those teachers who will be provided with coaching have sufficient knowledge of the area before they begin. This is something that is a feature of the 'My Teaching Partner-Secondary' (MTP-S) programme, which has been shown in two RCTs to have positive effects (Allen et al., 2011; Allen et al., 2015).

Despite the strength of the research base, there are nonetheless some challenges that are worthy of consideration. Firstly, whilst there is some evidence that instructional coaching can potentially have an impact at scale, there are a number of scale-up implementation challenges (Kraft et al., 2018). These include recruitment of coaches that are in the right geographical location and have the required skills, as well as ensuring teachers are bought into the programme. As with mentoring, teacher buy-in can be a challenge, particularly if there can be issues of perception about what the coaching is for. Some schools have used coaching as a form of performance management, used to support those teachers who are perceived to be weaker, or are struggling. 'This stigma can remain for some time, meaning that even if a new model of coaching is implemented in the school, teachers can be unwilling to volunteer to participate.' (Lofthouse et al., 2010).

Finally, as a form of professional development, the cost of implementing a coaching programme appears to be reasonably high. However, existing studies have not included sufficient information about the costs of the coaching programmes to enable a robust cost-benefit analysis (Kraft et al., 2018). Whilst coaching seems like a good 'bet', further research in this area could be very valuable. Similarly, further research into effective programme features might help ascertain the active ingredients of coaching programmes and perhaps keep costs down (Blazar and Kraft, 2015).

Teacher coaching provides interesting opportunities to utilise technology to deliver the programmes in ways that might be more cost effective and easier to scale. There are established and impactful programmes that use videos of practice and phone calls to conduct the coaching and that have been shown to be effective (Allen et al., 2011; Allen et al., 2015). When used well, the use of video can also provide further opportunities for the coach and the teacher to reflect on and unpick practice through providing the means to re-watch multiple times (Lofthouse et al., 2010). However, the use of video is not without challenges and must be used carefully as there is a risk of teachers perceiving it as a method of evaluation rather than of support.

Conclusion

Mentoring and coaching are both forms of teacher professional development that can, when carefully implemented, bring great value not only to the teacher, but to their pupils, their mentor or coach, and to their school. Whilst distinct from each other, both approaches can provide effective professional development though may well be accessed at different times depending on the individual teacher and their needs. However, it is important that neither are seen as a 'silver bullet' or a 'quick win' to develop teaching or raise standards. Instead, care should be taken at all stages – from choosing or designing a programme, through to implementation and evaluation. Whilst there is a range of evidence to guide those who might be looking to implement a coaching or mentoring approach, further research in this area could support teachers and school leaders to understand more about how to implement effective approaches to mentoring and coaching.

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CASE STUDY

Using specialist coaching to enhance teachers' knowledge from speech and language sciences

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The national curriculum in England assumes that children start school with necessary speech, language and communication skills, ready to learn and develop quickly using reading and writing as the vehicle for demonstrating measurable competence. However, Law et al. (2017) demonstrate that five to eight per cent of all children in England and Wales are likely to have language difficulties.

Speech and language therapists and teachers provide support for children with speech, language and communication needs (SLCN) in different ways, and each profession has its own cultures, learning experiences and methods for evaluating and researching new ways of working. Teachers need considerable training to identify SLCN accurately and early on in a child's educational life, but this is not easily achieved. Ainscow et al. (2012) found in a Manchester-based study that teachers were missing around half of children's SLCN.

The specialist coaching approach

Based on a hypothesis that specialist training and coaching could mobilise the knowledge and skill sets of both teachers and speech and language therapists to better enable teachers to critically reflect on their practice, we undertook collaborative action research across both primary and Early Years settings in Derby, where high concentrations of children with speech, language and communication needs attend schools in socially deprived wards, and where many of these schools also serve populations of children whose first language is not English (Lofthouse et al., 2016).

In this new partnership, the speech and language therapists first led short group training sessions for teachers and teaching assistants. The training covered theoretical models from education and speech and language therapy research, including ages and stages of speech and language development appropriate to the age range of children that the teachers worked with. Practical approaches were highlighted, including those related to the research-informed 'communication supporting

classrooms observation tool', which was designed to profile the oral language environment of the classroom (Dockrell et al., 2012). During the training, participants were also introduced to basic coaching theory.

The participants then moved on to the specialist coaching stage. The speech and language therapists recorded short video clips of dialogue-based teaching in the teachers' own classrooms. As soon after the lesson as possible, the teacher watched the clip, followed by the therapist. Each made notes, reflecting on relevant aspects such as:

- the child/group of children
- their perceptions of the child's age and stage of development
- the provision in the physical learning environment
- the pre-planned language-learning opportunities created and the oracy and language-learning interactions deployed to support the children's vocabulary development
- turn-taking and social communication skills
- attention and listening skills
- understanding of language
- use of grammar, sentence structure and narrative skills.

Clips from the video were chosen by the teacher or the speech and language therapist, and the therapist then framed the conversation utilising coaching dimensions (Lofthouse et al., 2010). These coaching dimensions were first developed through a national teacher coaching research project, and provide a framework for developing productive coaching dialogue. The dimensions are:

- the subject matter (theme and focus of discussion) – in this case aspects from the list above
- who initiates the elements of the coaching conversation (allowing a focus on shared ownership)
- the stimulus created by the video clips, recall or artefacts (such as lesson plans or children's work)
- the tone of voice, with the speech and language therapists aiming to adopt a neutral and curious tone to engage the teacher in discussion rather than indicate a judgement
- the scale of focus, such as critical moments, teaching episodes, the lesson as a whole, pedagogic themes and school or societal issues
- the timeframe (past lessons, planning, the lesson in focus or future teaching).

In total, each teacher engaged in a series of three video-based coaching sessions with a speech and language therapist, creating cycles of critical thinking and reflection on live practice, enacted in a non-judgemental, creative learning space.

The impact

While this research has so far only been small-scale, those teachers involved reported changes to the way that they interact with children, and the training and associated

coaching helped teachers to understand concepts and terminology better. Teachers typically conflate 'speech, language and communication' into the handy education acronym (SLC) without understanding the component parts, but considering these individually allows for more nuanced observations of children, more accurate recognition of their actual needs related to age and stage of development, and a greater awareness of evidence-based pedagogical techniques that can be used to provide support.

'I found it really useful to talk about children with varying needs and that highlighted to me some children who have speaking and listening problems. Something else that was drawn to my attention as a fairly new teacher was the level of questioning... I became aware that I needed to identify the level that children were working at for speaking and listening, so that I could pitch my questions more appropriately to meet their needs.'

Teachers reported that they were more alert to emerging difficulties and able to respond early with bespoke solutions. They felt more able to accurately judge the child's developmental age and stage and report on the changes and progress in the children's communication skills, an increasingly important skill given the limited resou

rce for individualised speech and language support. Interviews with school leaders confirmed that real change was evident in their schools, and there was a developing capacity of teachers to support each other in this area of work (Laing and Todd, 2015).

This case study is an edited version of Lofthouse R, Flanagan J and Wigley B (2018) Talking it through: Using specialist coaching to enhance teachers' knowledge from speech and language sciences. *Impact* 2. Available at: *https://impact.chartered.college/article/lofthouses-specialist-coaching-teachers-speech-language-science/* (accessed 4 October 2019).

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Principled induction and mentoring of new teachers

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The need to provide appropriate support and learning opportunities for newly qualified teachers (NQTs) has long been recognised (Ingersoll and Strong, 2011; Feiman-Nemser, 2001). Challenges on a global scale in teacher recruitment and retention have intensified international consensus about the need for sustained learning opportunities and improved conditions for new teachers; to support their needs as 'novices' and enhance the quality of their practice (Cater, 2017; Sutcher et al., 2016; OECD, 2011). The learning and development of new teachers is crucial to their efficacy and retention, and core to this is the quality of induction and mentoring.

However, studies have shown the challenges of achieving effective mentoring and induction on a national scale (Hobson et al., 2009). Adequate time and professional learning, to enable mentors to support the induction of new teachers as agentive professionals, is frequently underestimated (Daly and Milton, 2017).

In times of increasing policy intervention around the entitlements of new teachers, we examine how principled induction and mentoring can be achieved at scale in the context of variable, powerful school cultures. Harnessing the professional capital within schools has been argued to be essential to optimising the learning potential of a school for both its teachers and pupils (Hargreaves and Fullan, 2012). This relies on conditions that enable all members of school communities to benefit from their collective knowledge and experience, to forge new insights and practices.

Understanding induction and mentoring

The distinction between induction and mentoring needs to be clarified; they are not interchangeable terms:

> *Induction has been defined as the entire system of policy, resources, professional development opportunities, guidance, and support provided to anyone starting in a new role, in this case NQTs (Ingersoll and Strong, 2011), whereas mentoring more precisely relates to guidance and support provided by one or more experienced colleagues to the new teacher. So defined, mentoring is a component of induction (Bullough, 2012).*
>
> *(Langdon et al., 2014, p. 94)*

An extensive review of literature conducted by Langdon et al. (2012) identified 12 principles underpinning effective induction and mentoring, linked to three core 'assumptions' that characterise the learning and development of new teachers.

The first assumption is that, at national policy level, there is a commitment to the professional learning of new teachers and related resourcing. Secondly, leadership has a significant impact on the effective realisation of policy within school cultures for the induction and mentoring of new teachers. School cultures are greatly influenced by leaders, who have long been recognised as catalysts in mediating and shaping the enactment of national policy. Thirdly, mentors are capable of mentoring in that they are able to engage in co-constructive enquiry-based mentoring activities, termed as 'educative'. This does not suggest that a uniform 'practice' of mentoring is desirable. Rather, educative mentoring of new teachers comprises numerous practices that support mentors' own learning.

The principles, outlined in Table 1, go beyond 'survival' and enculturation into particular school environments (Britton et al., 2003), and instead relate to long-term learning goals for new teachers. They support educative goals for teachers' learning that can develop practice for both mentors and mentees, supported by national policy and resources. They indicate a shift away from what Stanulis and Brondyk (2013) have called 'buddy' mentoring, and emphasise teacher learning as an enquiry practice that is achieved through mutual endeavour between mentor and mentee (Norman and Feiman-Nemser, 2005; Langdon and Ward, 2015).

Mentors undertake roles as teacher-educators; going beyond passing on advice about practical teaching as a more experienced 'expert'. The mentor is positioned as a co-learner who is able to co-construct knowledge and understanding about teaching that can lead to the development of altered beliefs and practices for both mentor and mentee about pupils' learning and the role of the teacher.

Such principles indicate aspirational goals for mentoring. Talbot et al. (2018) have cautioned that educative mentoring that is transformational of learning and teaching for *all* those involved requires sufficient space and time to develop a 'complex set of pedagogical tools' that can support an enquiry stance, including critical reading of research, self-auditing and the development of 'dialogic mentoring' (p. 51). Peiser et al. (2018) – in exploring the challenges of realising principled goals for mentoring set out by national policy frameworks – suggest that the challenge for teachers to learn is greater than in other professions. Teaching, they argue, relies on a less clearly defined body of knowledge, in which the links between practical and theoretical knowledge are 'more tenuous' (p. 10). Professional knowledge for teachers is subject to 'alternative logics' (Hordern, 2016) that are influenced by policymaking and personal beliefs and, crucially, the shared practices within schools that help determine what is relevant for teachers to know and do. The realisation of educative mentoring goals, based on principles of enquiry, collegiality and mutually constructed learning, may therefore be elusive even where there is relatively generous resourcing and policy support.

1	There is coordination at the national, state or regional levels with regard to the policies and standards for induction and mentoring programs and for resource allocations associated with those programs.
2	The assessment standards and policy guidelines for induction and mentoring and the expectations associated with each are consistently and effectively communicated.
3	There are standards that guide the evaluation of NQTs.
4	Career-long learning and development is promoted by coordination between pre- service teacher education, induction and mentoring programs, and continuing professional development opportunities.
5	Effective leadership is foundational to NQTs' induction.
6	Models of quality teaching are present and observed within the school environment.
7	Work conditions are adapted to the NQT's novice status.
8	Collaborative and collegial school cultures support NQT learning and development.
9	Mentors in the school-based induction and mentoring program are willing and prepared to support the learning and development of NQTs.
10	NQTs' professional identity and their beliefs about learning and teaching are influenced by the experiences within, and culture of, the school environment.
11	NQTs are encouraged to make pedagogical and professional choices and to act on those choices as a means of building their sense of efficacy.
12	Because learning is always situated, the classroom becomes the primary site for the learning and development of both NQTs and their students.

Table 1: 12 principles for induction and mentoring (Langdon et al., 2012, p. 401.)

The complexity of schools

The complexity of schools is indicated in the principles (Table 1) quoted from Langdon et al. (2012). National, regional and local education policymaking help to shape the conditions within schools for new teachers to learn effectively (European Commission, 2015). Schools act within wider ecologies (Godfrey and Brown, 2018), in which forms of collaboration within and between schools are related to external stakeholders such as local authorities or universities who can support the mobilization and orchestration of diverse resources. Policy, linked to resource, influences extensively what is enacted as induction and mentoring by members of a school community and some aspects of induction and mentoring are affected by factors outside of, as well as within the school.

Interactions between individuals therefore take place within conditions that are constituted by the school system, classrooms, external players and the policy environment; which together shape values, understandings and practices, and inform the dialogue that takes place among stakeholders. From a socio-cultural perspective, numerous studies have indicated that school contexts impact extensively on the interactions among stakeholders, enacted through what Wenger (1998, p. 162) termed 'relations of practice'. These interactions effectively constitute the learning and development of all members of school communities, a theoretical perspective that informs extensive research into teachers' professional learning (see, for example, Cordingley, 2008; Flores and Day, 2006).

These dynamic relations create the potential for inconsistencies between policymaking and implementation, identified by Jones (2011) as 'the inability of policy-makers to

reach as far as the operational level of education – schools and their classrooms' (p. 760). Individual school contexts create variability and can have a major impact on the quality of induction and mentoring (Bubb and Earley, 2007), especially because school leaders exert considerable influence on schools as sites of professional learning; influencing the interactions that take place, both overtly and covertly (Timperley et al., 2007). They shape the conditions that mediate the organisational culture of the school, the interpretation and implementation of policy and how the needs of new teachers are addressed. In essence, within the wider ecologies that influence school cultures, the school leader is vital to the relations that contribute to induction and mentoring.

Schools thus provide complex environments for the learning and development of new teachers. Wenger et al. (2002) argue that schools reflect the affordances of communities of practice, by which they are dynamic and constantly evolving, constructed by their participants' interactions in contexts of internal and external policy change. These are the conditions in which induction and mentoring take place and in which the realisation of educative mentoring becomes possible, but is by no means a necessary consequence. School communities comprise interactions that are *non-linear* (between mentor, teacher, other teachers etc.), and *multi-layered* (interactions between the school system, individuals, classrooms, the community and the policy environment).

Achieving principled mentoring and induction

Achieving principled mentoring and induction therefore involves addressing multiple factors. The greatest challenge is for policy to lend support to leaders, encouraging them to harness the 'professional capital' within complex school cultures; learning within a community, fostering an enquiry perspective for teachers' as well as pupils' learning, and achieving genuinely dialogic discourse among professionals within and beyond 'mentoring' relationships.

For induction and mentoring to have a positive impact it needs to be premised on *all* stakeholders in the school community being learners – including leaders. Expectations need to be explicit, aimed at harnessing the capacity of all to participate on a range of formal and informal levels.

Professional development for mentors needs to be mandatory and to support access to external perspectives. Leaders too need supportive professional learning to lead change in schools and to re-orient their perceptions of themselves as learners alongside their NQTs and mentors. The relationship between national policy, school contexts and leadership is highly complex; it requires the reduction of pressures on schools brought about by policy agendas that are antithetical to, or distracting from, a sustained investment in all teachers learning within school communities.

This article is based on Langdon F, Daly C, Milton E, et al. (2019) Challenges for principled induction and mentoring of new teachers: Lessons from New Zealand and Wales. *London Review of Education 17(2): 249–265.*

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Improving teachers' instructional practice: Critically important, but incredibly hard to do

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It is a joy to watch how quickly a novice teacher can improve over the course of their first year, even with relatively little support and guidance from more experienced colleagues. Second year teachers tend to be visibly more proficient at the end of the year than they are at the start. We want *all* teachers to keep getting better at teaching, not least because it is the clearest route to improving the quality of education that schools provide. Moreover, it is also valuable for teachers themselves to *feel* they are getting better at their jobs, according to self-determination theory, a well-validated theory of motivation (Deci and Ryan, 2013; Reeve and Su, 2013). This theory tells us that generating a sense of competence at work is an essential part of sustaining a motivated workforce. Unfortunately, if simply left to their own devices, more experienced teachers tend to struggle to improve their classroom practice. This article explains why this is and explores why it is so hard to create effective professional development in schools.

Why learning stalls

Teachers make hundreds of instructional choices, whether consciously or unconsciously, every day in the classroom. Working out how to make better instructional choices, as with anything new in life, generally requires us to have both the will and the means. At first, this is straightforward. The imperative to work hard at getting better at teaching is extremely strong in the early years of a teacher's career. Simply getting to the end of the lesson plan whilst maintaining order in the classroom can feel like a herculean task.

Thankfully, through trial and error, most new teachers can acquire the initial toolkit of classroom routines that are needed to overcome the chaos of those early days. Many have drawn analogies between the process a new teacher goes through and Ericsson's deliberate practice cycle (Ericsson et al., 1993), for they must:

01 Try out a new and specific technique

02 Receive feedback on whether or not it worked

03 Adjust their practice in light of the feedback.

This process is relatively natural and straightforward for new teachers. They *must* try new things out in the classroom because they have no established practice to fall back on. The feedback they receive from the class on whether their instructional choices are good ones is often immediate and visible, and can even be quite brutal! This forces new teachers to return to the drawing board, adjusting their instructional choices in light of the feedback they received and hoping for more success next lesson.

Unfortunately for teachers, the easier and more enjoyable the job becomes, the quieter the feedback-adjustment signal sounds. Teachers quickly begin to exhaust the low-hanging fruit of accurate, unambiguous feedback they receive – they start to find that classroom order can be maintained and students appear reasonably engaged, regardless of the instructional choices they make as a teacher. This means that making decisions between alternative instructional choices becomes ever more challenging.

Perhaps the most important reason for this is that the feedback they receive is often inadequate, ambiguous or misleading, making it hard to ascertain whether what they did actually worked. The problem here is that we can only infer learning – the long-term retention and transfer of knowledge and skills – from performance of the student in class, on an assessment or otherwise. The actual learning taking place inside students' heads often deviates substantially from the performance we can see and measure.

Divergence between performance and learning is a pervasive problem in classrooms. Rob Coe (2013) has argued that much that goes on in the classroom – students who are busy doing lots of work in a calm environment, appearing engaged, being given feedback and (usually) supplying correct answers – can be poor proxies for the amount of learning that is taking place. This is particularly true in cases where pupils *like* a certain teaching technique, and therefore respond positively to it, but the technique does not actually bring about much learning. This problem of missing feedback from instructional choices helps explain why experienced teachers find it hard to improve.

Beyond missing feedback on their choices, though, experienced teachers face further difficulties. As teachers develop a repertoire of reasonably effective teaching techniques, their practice becomes consolidated in long-term memory and in doing so becomes automated, and therefore insensitive to any feedback they *do* receive. The habits of the classroom are needed to make teaching fluent, but they also actively stop teachers from adapting their practice to improve.

Psychological research supports the role of habits in impeding our development. A review of 47 experimental studies showed that people frequently fail to translate their intentions, for example, employing a better questioning technique in class into actions due to the presence of habits (Webb and Sheeran, 2006). Research suggests that humans are particularly prone to forming habits if they work in stable environments, if they perform the same actions many times, or if they work under stress (Wood and Neal, 2007). The classroom fulfils all these criteria.

So, even where they want to get better at teaching, more experienced teachers become hemmed in by habits and loss of the feedback signal. Equally important, at least for some teachers, is a decline in their drive to get better at teaching. For experienced teachers, spending time in the classroom has now become pleasant – enjoyable, even. That imperative to get better at managing the lesson simply to make it possible to get through it has faded.

Some teachers do still have a drive to improve their classroom practice – perhaps those we see taking Masters courses, reading books, attending TeachMeets, and so on. But for others, their attention has turned elsewhere. After a few years, many teachers start taking on responsibilities outside the classroom – whether pastoral or academic – and so begin the cycle of improvement in these new areas. And since the feedback and praise we receive, whether from pupils, parents or managers, is unlikely to increase in line with our expertise, it is understandable that the rewards to becoming an expert teacher feel a little muted.

Why instructional coaching fits the re-creation of this feedback-adjustment cycle

Feedback signal fadeout, accumulation of habits and decline in the imperative to improve can all explain why learning stalls. It is the job of professional development to kick-start the cycle of improvement. Instructional coaching is an approach that is used across many industries to mimic and support a cycle to purposeful improvement, whereby:

01 The coach and the teacher agree to focus on improving a specific aspect of performance

02 The coach gives feedback on how they performed

03 The teacher repeats the practice, adjusting it in light of the feedback.

There is high-quality and consistent evidence that shows that using instructional coaches for teachers improves their effectiveness better than other professional development programmes (Kraft et al. (2018) have reviewed the evidence). Not only are there a number of large-scale randomised controlled trials, some have now been replicated at scale and others have explicitly shown that coaching outperforms other professional development approaches in a multi-arm trial setting.

That said, like many 'interventions' designed to change behaviours, larger coaching programmes have been less effective than smaller ones, raising questions as to how best to deliver coaching at scale. Matthew Kraft and David Blazer (2018) outline a number of reasons why large-scale coaching programmes tend to struggle. When we move from a small to a large coaching programme, often the additional coaches we take on are less expert. We might also try to reduce the per-teacher cost of coaching to make the programme affordable at scale, but this is likely to lower the efficacy. Furthermore, larger-scale coaching programmes are likely to include teachers who themselves are more hesitant about taking part and who might be more unwilling to adapt their existing practice.

Many of these large-scale instructional coaching trials have only been implemented in the US and thus do not give clear enough signals to us about how we should organise coaching in our own school settings outside of the US context. The studies cannot prescribe who our expert coaches should be. For example, how important is it their subject and age specialisms are well-aligned with those of the teacher? How many years can an experienced teacher be out of the classroom before they can no longer be an effective coach? How many years of experience must a teacher accumulate, on average, before they are likely to be able to coach effectively?

One further uncertainty is about about how prescriptive to make an instructional coaching programme. These programmes usually require expert coaches to use observational rubrics as a framework for giving feedback – these may be crucial where coaches are inexperienced, but risk undermining the ability of an expert coach to use their time optimally in particular subjects or with particular types of children. Also, how tightly defined should be the area that the coach and teacher decide to work on together? Too narrow, and the possibility of it substantially transforming teaching is reduced. Too broad, and we face the risk that the coach is no longer able to give good feedback on whether or not the teacher has improved. We know, for example, that observers are generally poor judges of overall teaching quality in the classroom (Mihaly et al., 2013).

At its heart, instructional coaching presupposes that we know what expert teaching looks like, so all teacher and coach need to do is to work towards these standards. We certainly know a great deal about what *good* teaching looks like; it is less clear we can say the same for *expert* teaching since it is likely to be highly sensitive to the curriculum and demographics of the students.

There is a further problem with instructional coaching, and it is this problem that has been most keenly faced by headteachers in recent years struggling to deliver professional development on a tight budget: instructional coaching is very expensive. The coach's time is stretched across just one teacher's development, and additional time must be found for teacher and coach to meet together regularly. For less experienced teachers, instructional coaching would undoubtedly be helpful in getting them from less good to good, but there are too many of them for us to afford it. Instead, we just leave them to muddle through using trial and error, punctuated by the occasional 'training day' Can a 'training day' train us in instructional practice?

Schools with limited budgets seek out an 'en masse' means of delivering professional development to all their staff, and after-school training sessions or in-service training (INSET) days frequently fulfil these criteria. The frequency of this provision varies a great deal across teachers: one-in-three teachers report they have weekly professional development during term time; one-in-ten say training only ever takes place on the five training days that teachers in the state sector are entitled to (Allen and McInerney, 2019).

Surveys suggest that teachers are not satisfied with the quality of existing professional development provision (Allen and McInerney, 2018b). For example, less than a third of classroom teachers agree with the following statement: '*Time and resources allocated to professional development are used in ways that enhance teachers' instructional capabilities*.' In both primary and secondary schools, senior leaders who are likely to be organising the CPD are far more likely to think it is effective than are those who are receiving it! And whilst three quarters of teachers do believe that CPD has had at least a moderate influence on their classroom practice in the past, one-in-five say that if they were never again able to attend an INSET training day, it would have no impact on their classroom practice!

Teachers love to share stories of their worst ever INSET day experience, but over and above our humorous recollections are more serious questions about why these experiences are so poorly aligned with improving classroom practice. One curiosity about teachers and school leaders is that, even though they are experts in learning, they do not often apply this expertise to curating their own professional learning environment. By applying the types of questions we would typically apply to a lesson, it could allow us to work out why most professional development does not develop anything at all. The following three questions could help senior leaders decide whether their CPD is indeed professional development:

1. What is the objective of the session and is there any plausible route by which it *could* lead to improved instructional practice?

Many of the activities of in-service training days or external training courses would fail at this first hurdle because their objectives have little to do with the daily practice of teachers. They might help schools fulfil other duties, such as learning a new safeguarding process. They might help teachers comply with contractual duties, such as completing their annual performance review correctly. They might inform teachers as to how to meet the requirements of a new testing or examination framework. None of these is intended to improve teaching practice and increase what students learn in class.

Senior leaders deliver CPD sessions that are unconnected to instructional practice for a number of reasons, of which one is that it is very difficult to achieve this kind of CPD within a school setting. Teachers most frequently report they would like CPD sessions to support their curriculum planning (Allen and McInerney, 2018a), but in secondary schools where teachers specialise in a subject the CPD budget will rarely stretch to provide subject-specific professional development support. This might explain why secondary school classroom teachers are more negative about their experiences – 40% of them feel that CPD has had little or no impact on their classroom practice (Allen and McInerney, 2018b).

2. Are the delivery methods likely to lead to something being learnt?

We can use simple models of cognition to decide whether the instructional approach used during CPD sessions is likely to be effective. When new ideas are received, what is the relevant and existing knowledge domain that we are hoping to build on? How can the instructor elicit information about pre-existing variation in schema across staff and is it realistic that they can meet the needs of the teachers in the room?

Assuming the ideas to be taught are relevant, are teachers able to attend to the salient ideas during the session, without too many distractors? What approaches are used to make the ideas memorable and what opportunities are given for the teacher to elaborate, extend and apply the ideas to their own classroom setting?

3. How will new ideas get established into the repertoire?

Instructional approaches can only get established into a repertoire if they can be remembered through the act of retrieval at several points in time after the initial session, ideally building up to the point of automaticity. The importance of this cycle of revisiting and re-practising new ideas is one aspect that is so well-emphasised by instructional coaching, but other collaborative professional development approaches such as Teacher Learning Communities and Lesson Study often succeed in achieving this too (Wiliam, 2016).

In everything we do, we are trying to avoid the all-too-common experience described by a teacher called Kate in The Teacher Gap (Allen and Sims, 2018):

"With normal CPD, you go to the session, you take away a technique from it which you want to try, you maybe do it once or twice in your classroom, but then perhaps it doesn't work so well or you get distracted by day-to-day stuff, and then you kind of find it in a dusty folder in your desk at the end of the summer term."

When we pose the three questions above to our existing models of CPD provision, it becomes clear how very difficult it is to devise any type of en-masse 'course' that can meet the development needs of a diverse group of teachers in a school. One promising, low-cost experiment which has faint echoes of instructional coaching, but seems feasible for leaders to implement without new funds, is worth considering as an alternative. Papay et al. (forthcoming) simply scored teachers on a rubric, matching those who lacked certain skills with others who had strengths in those areas. By simply encouraging these teacher pairs to work together improving teaching skills over the course of the year, these experimental schools saw teacher quality rise. However, for now, this is just one experiment – the lesson of educational research is that we need to achieve replication in a variety of settings before we should recommend school leaders implement new programmes at scale.

Conclusion

The teaching profession is undoubtedly in agreement that CPD matters – unless we take our medicine we will find it hard to improve as teachers. However, we cannot agree what sort of medicine we should license for use. Instructional coaching has performed well in the early 'drug trials', but is far too expensive for everyone to take. Like the National Health Service, perhaps we should set up a waiting list for our patient teachers. Wait for enough years and many teachers will get better enough on their own without the need for coaching; others will drop off the waiting list by dropping out of the profession. A goal of finding the money to treat all teachers who are three or four years into their career and who would like the coaching medicine seems more realistic. After three or so years, teachers tend to have the capacity to work at getting better at something specific, and their habits may not be so ingrained that they are impossible to overcome.

Beyond the expensive treatments, we also need a scalable and cost-effective means of helping teachers get a little better at what they do each term. It is this cheap, low-dose medicine that we lack – the five INSET days a year certainly aren't hitting the mark. I have suggested some basic benchmarks for ensuring that CPD sessions at least have some plausible means by which they *might* help teachers improve. Even meeting these on the surface does not mean they necessarily *will*, of course. That said, simply delivering CPD that teachers *believe* is helpful is an important first step, and a lower hurdle we should aim to

consistently meet. For if teachers believe CPD is helping them improve, this alone will help maintain their sense of growing competence and thus promote autonomous motivation.

And in the meantime, we should remember that there is much more we can do to create working conditions where teachers *feel* like they want to get better at teaching. I would start with worrying about whether schools can provide teachers with a stable curriculum, with assignment to appropriate classes, with a healthy approach to workload to give teachers the space to think about their teaching, and of course a culture where teachers can teach and are encouraged to get better at teaching on their own.

I do think that supporting teachers in getting better at teaching is critical to teacher morale and the long-term health of the schooling system. I just don't know whether we've found our medicine.

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CASE STUDY

National Tablets Programme, Kenya – improving the coaching provided to teachers

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The National Tablets Programme was introduced by the Kenyan Ministry of Education (MoE) to improve the support offered by coaches to teachers implementing a new literacy initiative in Grades 1–3. The project was piloted with 70 users as part of the Primary Math and Reading (PRIMR) initiative in 2013, and expanded to all of Kenya's 1,100 curriculum support officers (CSOs) and 70 instructional coaches working in low-cost private schools in 2015 as a key aspect of the delivery of the MoE's Tusome Early Grade Reading Activity. The CSOs provide coaching in the government schools; both CSOs and 'instructional coaches' are referred to here collectively as 'coaches'.

Previous research indicated that ICT interventions in the education systems of low income countries had had mixed results, with relatively few showing statistically significant impacts on student outcomes (Piper et al., 2017). However, an RCT conducted into the effectiveness of using ICT at different levels of the Kenyan education system found that assisting coaches to support teachers was a cost-effective use of ICT (Piper, 2016). The National Tablets Programme therefore aims to use ICT specifically to improve the efficiency and extend the reach of coaching.

The coaching approach

The National Tablets Programme uses technology to improve the practice of coaches, rather than to provide training directly to teachers. The coaches support teachers in the delivery of the new literacy programme, and the tablets are intended to improve the effectiveness of the support the coaches provide.

Each coach receives a tablet loaded with software that enables them to record the results of their teacher observations and provide feedback to teachers. The software includes four resources:

- a classroom observation tool with embedded lesson plans designed specifically for the Tusome literacy programme; data from the observations and measurements taken of randomly selected pupils' reading fluency rates are collected and analysed by the tool, which subsequently suggests points for emphasis for the coach to use in their feedback.
- PDF versions of all Tusome-designed books and materials, enabling coaches to compare their observations of classroom practice with suggested practice in the teachers' guides.
- A set of 30 instructional videos in English and Kiswahili providing visual examples of model teaching practice, many of which have embedded quizzes for the coaches to administer to check that teachers understand the content. Teachers are automatically directed to appropriate videos.
- A letter-sound practice tool that aims to address teachers' difficulties with differences in letter pronunciation between English and Kiswahili. Teachers are automatically directed to this when it is identified as being needed.

The project's impact

Researchers' ability to analyse the impact of the National Tablets Programme was limited by the fact that its national rollout meant that comparisons with a control group were impossible. Assessing its impact was also marred by its being put in place alongside the Tusome intervention without any opportunity for staggered implementation, meaning that the impact of Tusome could not be isolated from that of the National Tablets Programme.

The national survey data (Piper et al., 2017) available through the Tusome programme does, however, give an insight into whether and how the programme is changing classroom practice, and into its impact on learning outcomes and the ability of coaches to conduct classroom observations. The national survey results show high levels of use of the tablets by coaches and improvements in learning outcomes. Although it is not possible to isolate the exact impact of the tablets in this outcome from this dataset, this provides a useful indication of the overall efficacy of the programme.

An internal survey of coaches and county directors using the tablets was also conducted (Piper et al., 2017) which sought to understand their views on the quality and effectiveness

of the programme. A large percentage of coaches and county directors reported successfully implementing the tablet-based support in classrooms, and the consistent increases over time in the number of classroom observations being conducted suggest that the tablets have been successful in increasing coaches' efficiency. The results also show that coaches consider the tablets' tools to have increased the quality of the instructional support they provide to teachers. There are wide variations in the amount of time coaches spend in classroom observations, but the surveys suggest an increase in the time spent on classroom support, which is key to improving learning outcomes.

The authors thus conclude that ICT investments in low-income countries, when targeted at improving instructional support for teachers, can have positive impacts on classroom practice and learner outcomes on a country-wide level.

This case study is based on a longer case study that was initially published in McAleavy T, Hall-Chen A, Horrocks S and Riggall A (2018) Technology supported professional development for teachers: Lessons from developing countries. Available at: https://www.educationdevelopmenttrust.com/EducationDevelopmentTrust/files/34/3463d85a-031c-4f1e-9002-969b4daf4cdf.pdf (accessed 27 September 2019).

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How do we learn how to do something? The role of deliberate practice

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How do we learn how to do something? This question was made very real to me when, for reasons that would take too long to explain, I recently decided to get my amateur radio broadcasting license in the United States. To do so requires passing a 35-question multiple-choice test that includes questions about electromagnetic waves, resistor coils, and something called 'sporadic E.'

After some intensive studying for two weeks, I passed the exam, bought a small handheld radio, and was excited to begin communicating over the airwaves with others. Just one problem: *I had no idea how to make the damn thing work*. I'd spent weeks learning abstract concepts related to wavelengths and antenna gains, but when it came to operating the device I held in my hands, I hadn't a clue.

My abstract knowledge was, in a literal sense, practically useless.

As it turns out, operating a radio involves a great deal of what philosopher Michael Polyani described as 'tacit knowledge', knowledge gained from practice and experience (Polyani, 1958). Put simply, we learn how to do certain things by actually doing them. Driving a car, juggling, baking a soufflé – you can read (or watch YouTube videos) as much you like about these activities, but to truly learn how to do them is difficult, because they involve steps that are hard for other people to communicate.

The same is true for teaching. As the founder of Deans for Impact, a non-profit organization dedicated to improving how teachers are prepared, I've spent several years thinking about the knowledge and skills that comprise great teaching. I've come to believe that teaching involves a great deal of tacit knowledge, the sort of knowledge that comes primarily through experience and cannot be easily codified – though some have made noble effort to do so (Ball and Forzani, 2011).

But experience alone does not improve performance. To get better at something, including teaching, requires practice – but not all practice is equivalent. Just as one doesn't learn how to play the piano by sitting down and banging away at the keys, to improve at teaching requires more than just raw classroom experience. We need a structured approach (Deans for Impact, 2017).

Encouragingly, there is an emergent science to help inform that approach, known as 'deliberate practice'. Drawing upon insights from cognitive science, deliberate practice sets forth principles that appear common to improving performance in many domains (Ericsson, 2006). In other words, it's an empirical theory focused on practical application.

But how, exactly? In the course of writing this article, I realised that describing principles of deliberate practice in abstract would affirm the tacit knowledge problem, particularly given that I am not (nor have ever been) a teacher (Deans for Impact, 2016).

Solution: Ask actual teachers about how they improve their practice. In what follows, I share insights from my conversations with four teachers on the methods they use to get better, across four dimensions that form part of deliberate practice: (1) Goal setting; (2) Observation; (3) Feedback; and (4) Mental models. My hope is that these exemplars will provide tangible examples of what rigorous professional development looks like in action, such that we might foster the capabilities of all teachers to pursue this sort of self-driven improvement.

Goal setting

One principle of deliberate practice is setting specific goals. Practice activities should focus on improving a specific aspect of teaching, rather than working towards general improvement (Ericsson and Pool, 2016).

But this can be challenging, as David Wees, a teacher-educator who lives in British Columbia, Canada, described to me. Wees sees classrooms as teacher laboratories of sorts. Every lesson a teacher teaches is in essence a tiny experiment that may or may not result in student learning. The problem with classroom laboratories is that, unlike a science lab, there are a thousand things happening in any given moment, making it difficult to focus on improving one aspect of teaching in isolation.

Enter *Instructional Routines*. As described in the research literature, Instructional Routines are 'designs for interaction that organize classroom instruction' (Lampert and Graziani, 2009). On a more practical level, Instructional Routines provide a structured approach to delivering a lesson that, as Wees observes, 'reduces the variation' in how a teacher will teach a certain concept. By using an Instructional Routine, a teacher holds constant the structure of the lesson which in turn creates the opportunity to experiment with changes to specific aspect of practice.

Wees shared an example of this using the Instructional Routine 'Contemplate then Calculate'. The purpose of this routine is to get students to discern patterns and structures in mathematical calculations. At the conclusion of the exercise, students are asked to reflect on their thinking using written prompts created by the teacher.

But not all written prompts are created equal, as one maths teacher Wees worked with quickly discovered. This teacher had chosen the prompt 'Paying attention to _____ is helpful because ____' which seemed reasonable until students started submitting reflections that read 'Paying attention to STEVEN is helpful because HE KNOWS THE ANSWER'.

Points for honesty, but obviously not the intended result.

So, this teacher started experimenting with alternative prompts for reflection. And as it turned out, just adding a few words changed everything: 'Paying attention to ___ *in graphs* is helpful because _____'. This prompt forced students to reflect on their mathematical thinking, and articulate their thinking in ways that helped their maths teacher understand their reasoning.

Having a structure such as an Instructional Routine regularly allows for mini-experiments that isolate a particular aspect of teaching. This is a key principle of deliberate practice: Improvement activities need to be focused, rather than general.

Observation

At Deans for Impact, we believe teachers learn from seeing specific pedagogical practices modelled by other teachers. Indeed, we think of this as one of the fundamental 'building blocks' of teacher development (Deans for Impact, 2017).

Callie Lowenstein, a middle school teacher in Oakland, California, agrees. After six years of teaching, she continues to find teacher observations vital to her development as an educator.

'As a new teacher, I had the usual management challenges – it wasn't a total disaster, but I knew I wanted to do better,' Lowestein said. 'I started spending my prep periods down the hall, observing a teacher with 10 years of classroom experience. It was *so* quiet in there. When I went back to my own classroom, I started speaking in a very low, slow, gentle voice – and the energy in my room shifted too'.

This year, Lowenstein switched from teaching elementary age students to middle school. She found it harder to engage these students and thus made it a focus of her observations to see what other teachers were doing.

'My colleague Anna checked frequently to see if kids understood instructions – so basic, but this cut out the problem of kids tuning out because they simply didn't know what to do,' Lowenstein said. 'Jordan started his "do now" with a question that connected the content to students' lives – so the question of "Why are we even learning this?" was resolved from the get-go. And Lisa had students up and moving multiple times in the course of a single class period, shifting the energy and offering opportunities to interact with students at different tables'.

This tangibly changed Lowenstein's instructional practice. 'When I went back to lesson planning, I would note in my own plans when and how I'd do each of those key moves, and sometimes create an anchor chart behind my teacher desk, reminding myself of the big ideas or moves I wanted to bring to life in my own class', she said.

Feedback

Another key driver of improvement is high-quality feedback; feedback that is specific and actionable (Shute, 2008). And for many teachers, the biggest challenge is finding someone – anyone – who can provide such feedback.

Dylan Kane, a teacher in a rural area of Colorado, found an innovative solution to that problem; he provides his own feedback. He does this by making audio recordings of his lessons that he uses to self-critique his instruction.

For example, Kane recently worked to improve how he listens to students. Based on his review of the research, he identified three types of listening: First, evaluative – a student says something, the teacher says right or wrong. Second, interpretive – teachers try to understand student thinking, what led them to give the answer they gave. And third, generative – the teacher tries to use student thinking to inform next instructional decision.

Kane then recorded his lessons to analyse what sort of listening he was doing most often with his students. 'No teacher can be generative all the time – but is using that label useful to identify when I'm being interpretative?', he observed. 'Should I try to be more or less of a certain type?'.

Mental models

Deliberate practice relies upon mental models to guide decision. A 'mental model' in this context is simply an idea about what good performance looks like, and trying to align one's action to that model (Deans for Impact, 2015).

Michael Pershan, a teacher in New York City, sees this happening in two stages for teachers. In the early years, novices tend to have a mental model that hones in on a

particular teacher. 'You've got a coach, or YouTube video, or a person who's stuff you like,' he notes. 'For beginners, it's easy to agree what success looks like'.

But as teachers progress into their career, this changes, Pershan believes, 'Pretty quickly in teaching we stop agreeing on what constitutes the skills every teacher should know'. At this point, teachers need to construct a new mental model for what sort of teaching they want to do, rather than what sort of teacher they want to be.

Pershan does this primarily through reading education research and drawing insights to spark new ideas about how he might teach. For example, cognitive science research suggests the use of 'worked examples' – essentially, a step-by-step breakdown of how to solve a problem – can be productive tools for learning. Pershan was initially sceptical but changed his mind after experimenting with using worked examples in class.

'I had a hard time seeing how this research was going to be something that would feel engrossing and puzzling to a student,' Pershan said. 'I thought of worked examples as "explanation just works. Kids will enjoy it, and they will learn!"'

But after seeing a carefully constructed worked example, 'it kind of clicked that it was different than the caricature I'd been exposed to,' Pershan said. 'It's not a relinquishing of careful planning – quite the opposite. It eliminates some variables so as to focus on others.' Pershan now uses worked examples regularly and finds them 'tremendously helpful'.

Summary

My goal has been to make some of the tacit knowledge of teaching more explicit, through conversations with teachers who think deeply about their teaching, and continually seek to improve. The strategies described here are far from the only ones teachers can use to become more effective, but they are consistent with approaches used to develop expertise across a variety of professional domains. Our challenge is to ensure that all educators approach their professional development in ways that will lead to what matters most – improving student learning.

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CASE STUDY

Transforming teaching through a coaching culture

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For two years I had responsibility for developing the quality of teaching and learning at the primary school in which I worked in West Sussex. One of our greatest successes was developing a coaching programme which was tailored to individual teachers, highly personalised and prioritised across the whole school.

Why teachers need coaches

Our philosophy on coaching was very much underpinned by Paul Bambrick-Santoyo's Leverage Leadership (2012). Bambrick-Santoyo (2012) explains coaching by drawing an analogy with athletes and their approach to development. For example, a professional sportsman such as Andy Murray will hit serve after serve; refining his approach to the smallest detail to perfect a match-winning ace. To do this, he cannot work alone. He has a coach whose sole purpose is to watch, observe and suggest ways to improve his serve. To get better, Murray needs regular and consistent support from his coach.

If you consider this within the context of teaching, it is clear that teachers – like athletes – push themselves to reach their very best. Reflecting on this, we as a school chose to take the route of developing a model of internal coaching, which offered regular and meaningful opportunities for all teachers to reflect on and develop their practice.

Our coaching model for teachers

In our model, a teacher was observed by their coach in an hour-long lesson. The teacher and coach then spent an hour discussing the lesson and teasing out the aspects of practice that would have the greatest impact on outcomes in the longer term. On average, two action steps were developed from the shared discussion – any more than this, and actions could become overwhelming. These agreed steps needed to be clear, simple and easy to implement swiftly.

Two weeks later, we repeated the process, looking for the impact of the suggested changes, and how the adjustments had developed the teacher's practice. Every teacher was entitled to six hours of coaching a year, meaning that each term, they had

one cycle of fortnightly coaching. We provided cover for staff and regular days were allocated so that coaching time was protected.

The most significant aspect of our coaching model was the use of video. This was developed after reviewing video clips available from Doug Lemov's Teach Like a Champion (2015). The ability to watch and reflect on the clips of 'expert' teachers helped us realise the potential of doing similar at our own school. It is amazing how much you can forget about the lesson when sitting down with a colleague afterwards, but if shown what happened, everything (and more) comes flooding back. Using video enables you to reflect on so many aspects of your practice: the language that you used to explain a concept, the quality of the model that you delivered, the impact of peer talk that occurred during an input. From your own body language and movement as a teacher down to the levels of engagement in your classroom, the first time you watch your teaching back, you will notice things about yourself that you never realised, and, through discussion with your coach, implement actions which, though small, will have long-term significance on your practice. We keep videoing simple by using an iPad and a tripod.

For coaching to be a success, you need excellent practitioners in your setting who respect their colleagues and can confidently develop discussion after any lesson – there is always something to explore. It is important that coaching is kept separate from formal observations. In its truest form, coaching should be completed by peers, and if schools have the capacity and skills to ensure that each teacher receives coaching from a peer, that's perfect. But where the stronger teachers also act as leaders in the school, it is important not to blur lines. As a coach, I pass no judgement on lessons; I do not complete any observations of teaching for performance management purposes. It is crucial that my integrity as a coach is not undermined and so it is the headteacher who completes formal observations after teachers have received their coaching entitlement for the term.

Lessons from coaching

There is much I learned as we established our coaching programme. In the beginning, not everyone wanted to be coached. Some thought it was intrusive, others overwhelming and for some it was an annoyance. However, over time, the programme evolved. We became much more reflective as a staff body, and discussions around teaching and learning were much richer. We stopped referring to videos as teachers started to know instinctively what they weren't happy about or what they wanted to increasingly focus on.

By offering a coaching continuum, we moved away from a snapshot view of teaching and learning. We knew about the quality of teaching children received every day, not just what could be a 'Sunday best' lesson for a formal observation. The quality of teaching improved across the school, as did pupil outcomes. Our school culture also transformed and it is clear that our staff love what they do. I am immensely proud of the journey we made and hope that others can learn from our experience and find a way of putting their own form of coaching into practice.

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The need for practice in teaching: Could simulations be the answer?

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Whilst the notion that with 10,000 hours of practice, anyone can become an expert at something (Ericsson et al., 1993) has been challenged in recent years (Macnamara and Maitra, 2019), the importance of deliberate practice – of doing something repeatedly, receiving feedback, refining your approach and trying something again – is nevertheless recognised as a critically important part of developing expertise (Deans for Impact, 2016). It makes sense that this applies equally to teaching – teachers get better rapidly in the first years of their careers and continue to improve over time if they are in supportive environments (Kraft and Papay, 2014), and cycles of instructional coaching with deliberate practice seem to support teachers in developing their effectiveness (Kraft et al., 2018).

However, there is one approach to enabling teacher practice that as yet has not been widely adopted but which has been argued to have potential for supporting teacher practice and development (Fletcher-Wood, 2016; Kaufman and Ireland, 2016): the use of simulation. This article explores some of the places where simulation has already been used in teacher development as well as its potential the conceptual and practical challenges in its use.

Understanding the use of simulation

Simulation is a relatively broad term usefully defined by Lean et al. (2006) as something for which the aim is:

> *to imitate a system, entity, phenomenon or process…attempt to represent or predict aspects of the behaviour of the problem or issue being studied… [and] can allow experiments to be conducted within a fictitious situation to show the real behaviours and outcomes of possible conditions.*
>
> *(Lean et al., 2016, p. 208).*

This could variously encompass anything from a board game or a written activity to a roleplay, decision-making scenario or fully-immersive computer simulation. This article

focuses on the application of simulation for training and development purposes. However, it is worth noting that there is also strong interest in the use of simulation to model potential outcomes and inform decision-making – through climate simulations, or teacher supply simulations in the education sector, for example – or to enable candidate assessment through in-tray exercises or micro-teaching scenarios.

There are many sectors in which practice in a low-risk – or as Koestler (2009) calls it, low-consequence – 'simulation' environment has long been seen as vital (Michael and Chen, 2006). This can vary from practising individual skills to decision-making at a system level. For example, doctors, nurses and other healthcare professionals practice carrying out procedures repeatedly because the consequence of making a mistake when working with a live patient would be huge. Pilots practice using flight simulators because of both the cost and risk of flying an aeroplane without having developed the skills in advance. Even where there is not an immediate risk of injury or loss to life – in business or manufacturing, for example – simulation is used to enable practice to reduce the risk of financial loss through poor decision-making or planning. Kaufman and Ireland (2016) note that the same benefits seen in other sectors can apply equally in teaching; from the chance to spend longer practising something than is possible in a classroom setting, to the ability to repeat a scenario or work through a more unusual situation.

Simulation in teacher training and development

However, 'practice' in teaching has typically taken a more traditional form. Whilst there may be some elements of roleplay with other trainee teachers during initial teacher training, novice teachers usually develop their teaching experience by observing, then co-teaching, before being supervised as they take the reins, with a gradual reduction in support and supervision until they have sole charge of their classes. The notion of deliberate practice (Deans for Impact, 2016), typically as part of an instructional coaching cycle (Knight, 2007), can involve practising particular elements of practice, such as the wording of a particular explanation, alone or with a coach rather than in front of a class. However, it also generally involves practising an approach with real pupils, as part of a teacher's day-to-day role.

It has been argued that the use of a medical-style approach to simulation could be useful in education, both to enable teachers to develop skills before they need to use them with pupils in higher-stakes environments (Kaufman and Ireland 2016), and to enable the notion of practice to move beyond the discrete skills – such as questioning – that are usually practised in instructional coaching and deliberate practice approaches, to something that reflects some of the more complex elements of managing a classroom:

> *The most effective practice-based training I've seen has been in 'simple' teaching skills. This makes sense: ensuring trainees master individual skills is crucial, the skills are hard enough, and 'practice' beats 'scrimmage' which simply teaches trainees that teaching is hard. Homerton's approach [to using simulation] makes me wonder whether we can go further, practising more complicated endemic scenarios: 'the projector fails thirty seconds before your lesson starts', 'three students need urgent attention simultaneously', 'a student wanders in from another lesson'. More complicated scenarios risk taking us beyond 'practising perfect', but might increase the power of practice, especially for skilled teachers.*
>
> *(Fletcher-Wood, 2016)*

A number of teacher development projects that make use of simulation in a range of different forms have already been undertaken, particularly in the United States. Benjamin Dotger's (2011) work perhaps draws most closely on the medical models lauded by Fletcher-Wood (2016). His work focuses on face-to-face simulations of a number of different scenarios acted out by highly trained actors playing the role of 'standardised' parents or pupils. A critical part of Dotger's approach is that the interactions between the trainee teacher and the actor are filmed and used by the

instructor and the trainee teacher to drive reflection, and that the trainees have the opportunity to discuss with each other their different experiences of and approaches to the same simulation.

Other simulation approaches tend to make use of technology to deliver some or all of the simulation experience. *TeachLivE* (Dieker et al., 2017), for example, is a mixed-reality simulation wherein remote human actors control the reactions of virtual reality pupils in a classroom as the teacher engages with them. SimSchool (Badiee and Kauffman, 2015), meanwhile, is a fully computer-based simulation that seeks to realistically and dynamically generate pupil behaviours for a whole class of pupils, based on a complex model of cognition and personality theory. At the simplest level of computer-based simulation, there are also a number of 'branching scenario' simulations, including the Penn Educational Leadership Simulations work (Penn Educational Leadership Simulations, 2013), although these are typically aimed at school leaders and focus more on management conversations or interactions with parents, rather than with pupils.

Although the approaches to simulation across these examples and the many others that exist do vary considerably, there are a number of similarities between them. They have typically been designed and used in the context of career preparation – initial teacher training for example – or school leadership development, rather than in-service training or CPD. They have typically focused on a more complex scenario or scenarios, rather than practise of a single skill. However, it is worth noting that many of these scenarios are actually set outside of the classroom, such as discussions with parents or team management tasks. Perhaps this is due to the complexity of simulating pupil interactions; this is discussed further in the next section. Finally, simulations designed for use in teacher development have also usually included an element of playback and interaction with a mentor or expert, requiring the trainee to reflect on their choices and articulate the reasons behind the decisions they have made, as well as discussing alternatives.

The majority of research around the use of simulations in teacher development has been small-scale and has tended to adopt participant self-report measures as a means of evaluating the effectiveness of simulation use. Some studies have indicated that simulation use can lead to an increase in participants' self-efficacy (e.g. Tucker and Dexter, 2011). Participant attitudes to use of simulations have also often been fairly positive. For example, Leyte's (2014) research with over 350 undergraduate teacher training students found that they had a highly positive attitude towards simulated teaching, in the form of live role play, as an effective way to acquire and apply both content and skills.

A small number of studies have gone further and have sought to measure whether simulation use actually changes teacher practice, and have argued that there is evidence of teacher behaviour change and of this change subsequently being reflected in the classroom. For example, Dieker et al. (2017) made use of pre- and post-test observations by trained observers focused on teachers' use of questioning, wait time and feedback to measure the effects of completing simulations in the *TeachLivE* environment. However, there is yet to be a large-scale impact evaluation to explore whether simulation use in teacher development actually improves teacher effectiveness. This, combined with the number of substantial challenges to the use of simulation in teacher development – from conceptual ones to more practical ones – which might explain why they are not yet, and perhaps should not be, in widespread use.

Challenges in simulation use for teacher development

Perhaps the most fundamental conceptual question is around whether the experience of an interaction with a pupil, teaching a lesson or running a school can be simulated in any way that is actually meaningful or useful. Developing an authentic simulation generally requires a very clear model of what is likely to happen in any given scenario (Kaufman and Ireland, 2016), what the impact of a decision is likely to be, and also often a 'correct' pathway or approach that should be followed. The current focus on evidence use in policy and practice (Goldacre, 2013) has led to greater understanding

of 'best bets' in approaches to curriculum, pedagogy and resource deployment through the work of the Education Endowment Foundation, for example (Education Endowment Foundation, 2018). This might provide some potential to develop a 'school-level' simulation tool based on the likely outcomes of decisions around, for example, staff allocation.

However, this is much more challenging at the level of individual student interactions within a classroom simulation. The same issues that Dylan Wiliam (2019) identifies with the notion of teaching as a research based profession – "Classrooms are just too complicated for research ever to tell teachers what to do" (Wiliam, 2019, p. 1) – mean that creating a meaningful classroom simulation is perhaps virtually impossible. There are challenges around context, nuance, implementation and inter-relationships with other approaches in use.

Related to this challenge is that in building a simulation – particularly a computer-based simulation – the designers are likely to need to make judgments about what approaches they wish to present as 'right' or particularly desirable. This leads to a risk of particular pedagogical approaches being privileged based on their ideological viewpoints, or at the very least to their impact being over-simplified. For example, some simulations allow the trainee teacher to plan for the pupils to engage in groupwork, a topic around which substantial debate exists and which may be effective or ineffective dependent entirely on how it is designed and used (Campbell and Bokhove, 2019). Assigning 'points', or improving or reducing student outcomes based simply on whether the user schedules groupwork or not, therefore seems highly problematic. These issues are particularly true for simulations which take the form of branching scenarios, which by their nature promote an over-simplistic approach.

Even if we were to overcome these challenges and be able to accurately model the outcomes of a set of possible actions, another challenge lies in how to make a teaching simulation feel as authentic as possible without it becoming so complex or time-consuming that it is unusable. In a live classroom, there are so many different things that can happen and so many possible responses to these, that even outlining what all the possible decision points are at any point of the simulation would be a huge task. Alongside this, the environment, the reactions of simulated pupils and everything else need to feel sufficiently believable for the simulation to feel 'real' enough to be worthwhile; the lack of variety and realism of pupil-teacher interactions has been an area criticised by some simulation users (e.g. Badiee and Kauffman, 2015). This may to some extent explain the tendency for simulations to focus on interactions between the teacher and parents or other adult colleagues, rather than pupils.

This moves us into the realm of more practical challenges. Developing a simulation that feels authentic is potentially hugely time-consuming and expensive. With computer-based simulations, the argument could be made that this is primarily an up-front cost and that, as with other online learning approaches (Maloney et al., 2015), the value will be recouped over time as the simulation is repeatedly used and scaled. However, they suffer more from the conceptual challenges above, and are likely to feel less authentic than simulations using human actors, which in turn suffer from the substantial ongoing costs required to deliver them (Bernstein et al., 2016).

Future potential

Given all of these challenges, perhaps the most interesting uses of simulation, and those which seem to have the most potential in teacher development, are those which take a rather different approach. Rather than seeking to simulate a set of decisions with pre-programmed impacts or 'correct answers', they instead provide a simulation scenario which is used as a stimulus for reflection and discussion; similar to the face-to-face simulations developed by Dotger (2011) but seeking to make use of technology for cost-effectiveness and scalability. The Educational Theory into Practice Software (ETIPS) online cases (Albaugh et al., 2009; Tucker and Dexter, 2011) are a good example of this kind of approach. Rather than a highly immersive simulation, they provide a series of scenarios and school contexts in which users are encouraged to consider what they would do and how they would make decisions, before responding with an open, written answer and discussing these with peers. This

encourages reflection and collaborative professional learning whilst reducing some of the challenges in simulation use that arise from trying to accurately simulate what would happen in a given situation and context.

A final interesting theme that has emerged from some studies of simulation use in teacher and school leader development is the power of teachers and leaders developing their own simulation scenarios (Bernstein et al., 2016; Tucker and Dexter, 2011). This is less about the finished product that they design, and more about the processes of reflection and working through multiple possible outcomes that are involved in simulation design, leading as they do to a more research and evidence-based approach to decision-making.

A common theme of both of these approaches is that they mitigate some of the challenges involved in attempting to define the 'correct' approach to take in a simulation, and draw instead on the power of engagement with research and discussion with peers, to enable reflection on a whole range of possible outcomes. This, combined with the common themes from across simulations, such as the ability to 'replay' and talk through decisions with peers and/or a trained mentor or observer, helps to create an experience that is more aligned with what we know about effective professional learning (Cordingley et al., 2015) with simulation as part of the picture, rather than relying on simulation as being the whole learning experience.

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CASE STUDY

Instructional Coaching within the Education Development Trust and Chartered College of Teaching 'Accelerate' programme

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We know that teacher retention is a significant issue in the UK, where around a third of teachers leave the profession within five years of first qualifying (Department for Education, 2018).

Accelerate is a four-term programme, funded by the Department for Education as part of the Teaching and Leadership Innovation Fund (TLIF), providing high-quality support and professional development to teachers within these vital first five years. The aim of the programme is to improve teacher quality, teacher retention and ultimately impact on the quality of outcomes for students.

The programme is delivered by the Education Development Trust in partnership with the Chartered College of Teaching and utilises a blended-learning approach, combining face-to-face and online training to support teachers in developing their professional knowledge. In addition to this, all teachers on the programme have access to an expert instructional coach who supports them to implement changes to their practice.

The instructional coaching model within Accelerate has evolved from the work of Jim Knight (2007), taking a dialogic approach, with teacher and coach working in partnership, each offering valuable contributions to the coaching discussions. The intention is for the coach to observe, listen and probe in order to elicit deeper understanding and reflection on the part of the teacher and to work with the teacher to ensure there is a clear focus, identifying specific steps they will take in order to develop their practice. As the expert, the coach is positioned to offer advice and guidance, and is encouraged to share their expertise as part of the coaching dialogue. However, the ultimate decisions about what to focus on always sits with the teachers themselves.

Coaching takes place across three terms of the programme, linking to each of the key domains within the online and face-to-face content of the course, as follows:

Coaching Cycle	Domain
Cycle 1	Term 2: Behaviour
Cycle 2	Term 3: Instructional design
Cycle 3	Term 4: Assessment / Responsive teaching

During each cycle, there are four coaching sessions: typically, a longer face-to-face session at the start of the cycle, followed by three video-coaching sessions.

Video-coaching was selected as the preferred mechanism for coaching within Accelerate, with teachers capturing short (10-15 minute) clips of classroom practice and sharing these with their expert coach. Using IRIS Connect software, both teacher and coach review the videos of practice prior to the coaching conversation, facilitating discussion and shared understanding. Using web-based, virtual coaching also limits potential constraints that may exist when relying on local coaches (Kraft et al., 2018). As a result, the Accelerate programme utilises a national network of expert coaches, who are closely matched to teachers' phase and/or subject.

The Accelerate model of instructional coaching aligns with that characterised by Kraft et al. (2018), in that it is:

a individualised (coaching sessions are always 1:1)

b intensive (with four coaching sessions across a term, coaching sessions typically take place every couple of weeks)

c sustained (coaching takes place over three terms)

d context-specific (coaching takes place within the context of the teachers' own classrooms)

e focused (using deliberate practice to enable teachers to develop and hone specific skills)

Deliberate practice is integral to the instructional coaching model used within the Accelerate programme. Characterised as 'purposeful practice, designed to maximise improvement' (Deans for Impact, 2016, p.2), deliberate practice is a powerful mechanism for supporting the development of expertise for novice teachers. Engaging in a cycle of deliberate practice enables teachers to focus on specific challenges, working with their instructional coach to break their goals down into actionable steps which they can implement within the classroom. Importantly, teachers benefit from high-quality feedback from their instructional coach, which enables them to make adjustments and hone their practice further.

The instructional coaching that takes place within Accelerate is underpinned by a series of rubrics (one for each domain). These rubrics are intended to be used formatively, focusing the coaching conversations, and supporting teachers' reflections, allowing them to identify strengths and clear steps for deliberate practice. The rubrics are exemplified by videos of expert teaching and are complemented by comprehensive, subject-specific online content which ensures teachers develop the related pedagogical-content knowledge required to facilitate changes to their practice.

The expert videos are an essential feature of the programme as they provide teachers with excellent models that can be closely examined as part of the coaching dialogue. They enable the teacher, with the guidance of their coach, to pinpoint particular features that may aid their development and ensure teachers have a clear understanding of the standard they are aiming for. Typically, instructional coaching approaches provide opportunities for the instructional coach themselves to model

identified strategies or techniques within the classroom, however this is not possible when using a video-based coaching approach. Not only does the use of expert videos of practice overcome this, but the ability to 'capture' exemplary practice means that these videos can be utilised beyond the realms of the classroom, and returned to if needed, allowing greater opportunity for focused discussion and further development.

Concluding in March 2020, this comprehensive and focused programme is designed to have sustained impact, supporting early career teachers in addressing some of the key challenges unique to them and putting them on the path to becoming 'expert' teachers.

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Collaboration, subject expertise and research engagement

05

Collaborative engagement in and with research: A central part of the CPD landscape

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Academic researchers communicate, organise and represent research through a focus on academic excellence, generalisability and validity. Like a planet spinning in space, they seek to build evidence that can move between teachers and schools, rotating, as it were, free from the constraints of location. So, they take pains to make their evidence generalisable. Teachers and leaders engaging with research, meanwhile, organise their efforts around developing their practice and realising their aspirations for their pupils. In full possession of detailed evidence about their specific contexts and pupils' needs and starting points, they look to research to inform; they privilege relevance and action over investigation and publication.

The reality is that both matter. Both are cognitively and professionally demanding enterprises. But for the teachers, the researchers' 'planet' becomes a large globe held in human hands. It doesn't need to rotate to serve multiple contexts because there is a single, real one in play. It doesn't need an abstract model of validity for multiple contexts, because validity can be tested by teachers with their own pupils. And what binds the two is an interest in the role of evidence in defining a challenge, identifying good bets to make a difference, and refining practice gradually as new approaches are established in the light of evidence about how pupils are responding.

This short paper summarises large-scale evidence about the role that engaging in and with research and evidence plays in teachers' continuing professional development (CPD) and learning (CPDL), and in enhancing pupils' learning. In doing so it unpacks evidence about CPDL and how it connects with wider research, teachers' own research, and day-to-day evidence from classrooms. It also explores the roles that collaboration, the development of professional learning communities and the leadership of CPDL can play. It conceptualises the use of research as work-based professional learning and, above all, it tries to answer the question: what makes engaging with research a professionally rewarding activity that contributes both to our own and our pupils' learning?

The evidence – a bird's eye view

Over the past twenty years there has been a range of systematic research reviews undertaken about effective CPD activities and their impact on both teachers' professional learning and on outcomes for pupils, as well as – to a lesser degree – about the contribution of research to CPD. In 2015 there were enough high-quality systematic reviews of the CPD evidence to merit a systematic review of systematic reviews, Developing Great Teaching, which identified a number of key CPD processes and experiences linked to positive outcomes for both teachers and pupils (see Cordingley et al., 2015). Interestingly and importantly, this accumulating body of evidence also relates closely to the evidence from the more singular Practitioner Use of Research Review (Bell et al. 2010).

What are the characteristics of CPD that makes a difference?

CPD needs and aspirations vary as much as the members of the profession. So, unsurprisingly, evidence about what makes a difference to pupils as well as teachers spans a wide range of combinations. But there are some strands of activity that seem common to all the reviews of effectiveness. When there is evidence about benefits from CPDL for pupils as well as for teachers, the activities are:

01 linked with support for professional learning that is specifically organised around the teachers' aspirations for their pupils through a sustained (over at least two terms) programme of iterative, structured, evidence-rich activities

02 planned to create a rhythm of sustained support for CPDL, so that the activities are focused, and action and enquiry oriented

03 organised to help teachers develop new or refined approaches to practice whilst also understanding *why* different approaches do and don't work in different contexts

04 supported by specialists who work sensitively to provide expert support geared towards helping teachers to secure depth in their professional learning

05 supported through structured and evidence-rich collaboration with peers as new approaches are refined and embedded.

The importance of organising CPDL around aspirations for pupils rarely needs much explanation. Once stated, its value is obvious. But it is not always observed in practice (Cordingley et al., 2018). Few CPD programmes have the luxury of time in which to cover all aspects of a given development. Teachers self-evidently bring knowledge of their pupils to their learning but when push comes to shove, thinking about pupils in CPD contexts is often limited to identifying a particular learning challenge in the school or system and leaving teachers or schools to make high-level choices about priorities in selecting foci for CPD. This is rather different from explicitly working out with teachers what their pupils' learning should and could look like in a range of contexts if their own professional learning is successful.

Creating a sustained rhythm in professional learning is similarly challenging to establish. Departmental subject and phase meetings have a crucial part to play in bridging learning from workshops, seminars, whole school CPD sessions and day-to-day practice.

Teachers are action-oriented professionals working to exacting timescales. The temptation in CPD contexts can be to look for the headlines of a new approach, for practical suggestions for implementation and ideally for tools and materials that can

be rapidly put to work. All of these ingredients have their uses; they help to scaffold the uncertainty that arises as teachers have to cope with the dynamic changes in many aspects of classroom practice that flow from changing a small number of factors to accommodate new ideas and thinking. But they are not enough. Teachers also need access to the underpinning rationale for new approaches to help shape reflection and enable them to adapt and refine their practice in ways that don't undermine or distort them. Without such a rationale or developing a practical theory, teachers risk simply enacting new ideas in the form in which they first encounter them, rather than refining them for their own pupils and context.

The importance of support from a range of specialists is strongly prevalent in the CPDL research, taking a number of different forms and provided by a range of different actors. In the international evidence, the support is almost always external to the school, which is not surprising given that CPD in other jurisdictions is very often provided by higher education institutions, school districts, or local or national government agencies. There are as yet too few studies of the school-based – and now Multi Academy Trust-based – CPD that is now such a strong feature of CPDL in England. What is clear is the range of roles that specialists need to bring to bear, and the skills they need to carry these out successfully. Perhaps the one that is least frequently enacted systematically is the support for building formative assessment of both pupils and their teachers into the rhythm of the CPDL. Insights from pupils' learning that are surfaced by powerful Assessment for Learning tools provided by CPD facilitators can help them to refine their support to the teachers, as well as helping the teachers to transfer learning from workshops to classrooms.

Collaboration and professional learning conversations and communities

Surprisingly, whilst structured and evidence-rich collaboration between teachers is a strong component of effective CPDL, professional learning conversations between teachers are not linked with success for pupils unless they are organised around two vital ingredients:

- Firstly, professional learning conversations and collaboration need to be rooted in experimentation with new approaches to be linked with success. Professional learning conversations and communities that focus on descriptive sharing of current approaches make little difference. If we continue to do and talk about what we have always done, we will get what we always got. It is working through and reviewing together the effects of activities that disturb the status quo that helps teachers review their approaches, beliefs and assumptions through a fresh and reflective pair of eyes.

- Secondly, the positive effects of exploring micro-experiments also depend on doing this in the context of evidence about how pupils are responding to changes.

Similarly, there were a significant number of studies, and some reviews of professional learning communities and collaborative contributions to CPDL, where other key ingredients of effective CPD were missing; where, for example:

- the focus was mainly on the teaching rather than pupil learning

- the focus was on professional conversation or building a professional learning community as an end in itself, rather than as an environment in which it is safe to explore evidence about puzzling pupil responses, doubts about understanding or implementation, and other inevitably challenging outcomes of risk taking

- the focus was on exploring and sharing existing practices rather than incremental development and refinement of new ones.

In these contexts, collaboration was a necessary but not sufficient indicator of success.

There is another interesting caveat in the evidence about collaboration within CPDL. Whilst a very small number of extremely costly programmes achieved benefits for pupils in the absence of peer support, in those cases the external support was so long-term and intensive that the CPD facilitators began to seem to the teachers (and the facilitators themselves!) to be part of the team. Structured collaboration and shared risk between peers achieved the same results rather more cost-effectively and sustainably. Key to this was the way in which shared exploration of evidence about the results of reciprocal risk-taking helped to build a shared *sense of purpose*. CPDL activities designed in ways that aligned with this evidence proved to be as effective for teachers who were conscripted to CPD programmes as to volunteers and natural enthusiasts. The development of a shared sense of purpose organised around the teachers' aspirations for their pupils was an important contributor to this. Similarly, collaborative professional learning with peers was linked with accelerating the trust-building needed to navigate the emotional demands and complexity of unlearning established habits and routines to create space to develop new ones.

It is almost certainly this kind of evidence about the essential nature of specific components of collaboration that leads to the fact that some studies have surfaced negative evidence about collaboration.

What doesn't work?

The evidence goes a bit further to also highlight things that are not effective. CPD activities that are not contextualised for specific subjects and/or for specific sub-groups of pupils are not linked with evidence of success for pupils. Teachers need to be able to contextualise what they are learning for a number of real-world contexts if they are to put it to work in their classrooms. Such contextualisation is key to linking learning in seminars and workshops to day-to-day classroom experiences. So, effectively-led subject and departmental meetings, where time is set aside to reflect on learning from seminars and workshops and consider its implications, represent an important bridge.

Whilst it is true that CPD support that is focussed only on subject knowledge and not on its application in practice was not linked with pupil progress; in fact there were very few programmes of this kind.

What additional light do reviews of evidence about engagement with research add to this picture?

A large scale and technicalsystematic review of the evidence about teacher engagement with research was completed in 2010 (Bell et al., 2010). This review provides a reliable overview of the direct evidence about teacher use of research at that time. It identified a spectrum of teacher support and activity encompassing at one end full teacher immersion in undertaking research, and at the other end deep engagement with the research of others. Effectively designed research engagement was linked with evidence of accelerated pupil progress. Perhaps unsurprisingly, the components of effective research engagement closely resembled those explored above as being important for effective CPD.

Engaging in research

Effective engagement in research involved teachers in carrying out usually collaborative enquiries exploring questions they had set themselves, often based on diagnostic evidence about their own setting alongside wider evidence from academic research. They worked with expert researchers or specialist consultants in their field of enquiry or development to design ways of collecting and analysing evidence related to those questions and to the steps they were taking to develop their practice. It also involved teachers writing up their enquiries to create a report for publication, either informally in a school network or more formally through either submission for a masters or PhD qualification, or in a research journal.

Engaging with research

Effective engagement with research involved teachers carrying out collaborative enquiry-based activities, often working to questions set by researchers as part of a larger study or a wider development project. They too were involved in collecting and reviewing evidence, but did so using research instruments developed by academic researchers or programme developers. Similarly, they were involved in reflecting on their own evidence and that of close peers. But they were not involved in developing evidence collection tools, analysing practices and results in multiple settings, drawing conclusions or reporting the outcomes. They were sometimes described as co-researchers or practitioner partners of researchers, but the focus or purpose of their involvement was to further their own development whilst contributing to a wider study or development initiative.

This approach illustrated and highlighted in the systematic review echoes the approach to Spirals of Inquiry; highlighted as a tool for engagingexperienced educators in collaborative inquiry (OECD 2017). It consists of six stages: scanning, focusing, developing a hunch, new professional learning, taking action and checking to see if a difference has been made. Each stage in the spiral is framed by the following three key questions: What is going on for our learners? How do we know? and Why does this matter? (OECD 2017). The Spiral of Inquiry is an 'ongoing spiral of inquiry, learning and action' (Timperley et al. 2014 p. 6).

Interestingly, recent research by the Education Endowment Foundation (EEF) about teachers' research engagement in English schools suggested that teachers are willing to engage more with research evidence than was the case a decade or two ago, and many schools are supportive of evidence use. But it also suggests that when teachers are making decisions about a whole-school change or teaching and learning, it is most likely that they will draw on their own expertise rather than on research (Walker et al. 2019; Nelson et al. 2017). There are, of course, variations. Nelson et al. (2017) found that senior leaders were more likely to engage with research than classroom teachers, and that teachers in secondary schools were found more likely to engage with research than teachers in primary schools. Similarly, teachers in schools with low Ofsted ratings were found to be more willing to engage with research than their peers in "Good" or "Outstanding"-graded schools (Nelson et al., 2017).

Benefits

Both these approaches matter. There are significant benefits to researchers and teachers in using large-scale studies and programmes to support teacher engagement with research. For example, designing a proactive practitioner enquiry model into evidence collection for large-scale studies can help researchers to persuade schools to provide access to teachers and pupils for research, and creates a moral justification for taking up teacher time. Support from specialists in designing evidence collection and professional learning tools also provides a natural environment for developing structured and evidence-rich, collaborative, enquiry-oriented professional learning. The focus on a wider goal positions CPD as proactive professional learning and considerably enhances the possibility that the research will be well-informed by the daily realities of school life, and thus the outcomes will be relevant and useful to practice.

The benefits of teacher engagement in research also exist at several levels. Firstly, it involves participating teachers in designing and working through the processes; shown above to be crucial for ensuring depth and quality in professional learning. Secondly, such teacher-researchers are often influential within their schools and local networks. This draws them naturally into the work of making their own research findings useful to other teachers. There is nothing like learning to teach something to others for accelerating, testing and deepening one's own understanding of new knowledge and its applications. Thirdly, the development of teacher-researchers who have a public voice in knowledge creation helps to position the profession as an intellectual as well as a practical one, which increases its standing and status in wider society.

What it means for practice

Few teachers have the time and opportunity to work through all the formal stages of engaging in research on a regular basis. In this sense, engaging *in* research is for Christmas. It matters that some teachers do this and that other teachers take an interest in their work. What I think the evidence shows though, is that engaging collaboratively, systematically and in an enquiry-oriented way *with* research as part of CPDL is important and manageable for all teachers. Engaging *with* research, in that sense, is for life.

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CASE STUDY

The East Sussex Early Years Improvement Team's 'Interacting with babies' collaborative research project

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A national review by Canterbury Christchurch University (Goouch and Powell, 2013), identified that baby room practitioners often feel isolated from other practice in their settings, especially if they are in separate rooms. Research such as the Osgood report (2017) identifies a need for more practitioner training focused on children aged from birth to three years. Page et al. (2013, p. 13) recognises that 'More importantly than ever before, practitioners must understand the research and theory which underpins their day to day work and decisions; for without such theoretical knowledge what they do can lack rigour and a rationale. It is like a building without foundations.'

The aim of our project, therefore, was to create a learning culture of professional reflection for a community of baby room practitioners. Following successful projects in other counties, we wanted to know whether conducting practitioner action research, focused on interactions between babies and baby room practitioners, could improve reflective practice.

Approach

Fourteen settings were chosen for their diversity of ownership, layout and geographical spread. We understood that practitioners would need guidance in undertaking action research, as research skills are not necessarily expected at this level. To meet the aims of the project, the two East Sussex project leads:

- asked each setting to identify a lead practitioner, ensuring that the managers were supportive.
- held a launch event for both the setting manager and lead practitioner to attend.
- shared an interactions self-evaluation tool to be used to identify areas of practice for the research focus.

- completed observations of interactions in each setting at the start of the project, using an observation format adapted from ITERS and other research. This included how babies were encouraged to interact with each other, how practitioners interacted with babies, the language used and whether they were responding to non-verbal communication. Results were shared with each setting and scored to provide quantitative data.
- provided support and guidance on research methods.
- encouraged practitioners to observe interactions and provided an example tally chart to clarify whether non-verbal communication was being recognised.
- helped them to review their individual research question and break it down into more manageable chunks. Practitioners were given a timeline to the five-month project.
- held a self-confidence and self-esteem session provided by an external expert.
- held four network meetings for the leads and a separate meeting for managers. These provided professional dialogue, critical reflection and assistance where needed. As practitioners researched more, we sometimes had to draw them back to the focus on interactions.
- provided the opportunity to borrow books related to baby room practice, child development and action research skills. We signposted to research articles and websites.
- set up an email group to share research. This group was for the practitioners only and not the managers, as we wanted a safe space for them to ask questions without a manager wondering why they didn't understand/know that.
- repeated the observations at the end of the research phase to compare practice.
- held an end event to celebrate their projects.

Practitioners were asked to:

- complete reflective journals recording their reading, relevant information, observations, etc. in order to support information processing.
- complete the self-evaluation tool at the beginning and end to evaluate knowledge progress.
- complete a case study, including an overview of their setting, starting point, what they did/found, the impact and any future plans.

Impact

Our analysis of the link between this research and practitioner practice consisted of:

- evaluation of any improvement when observing practice. Significant improvements in interactions occurred in all settings. Settings that were weakest at the start saw the biggest improvement (42.86 per cent in one case).

- self-evaluation at the end of the project, which suggested that practitioner knowledge had increased across all areas of interaction, and not just their specific focus.

Although not officially part of the project, observations demonstrate that learning environments have improved as information is gained. In many settings, parents became involved in the project, extending the learning community and sharing knowledge and ideas.

All settings have reported an increase in confidence of the lead practitioner as they shared their research skills across the wider setting. This has raised the profile of, and respect for, baby room practice and staff. Some settings focused on interactions between babies and non-baby room staff, further extending their learning community.

Challenges included staff changes and other demands on setting time. All challenges diminished as a setting-wide learning community became fully developed.

Reflective practice has increased as practitioners have expanded research to other areas of practice: for example, they have linked missing non-verbal communication with babies to missing play cues in older ages. Practitioners reported relishing being part of a learning community, listening to other people's findings at network meetings and reflecting together. Particularly helpful was talking about practice with others in relation to common concerns and issues.

This project identified that practitioners of all qualification levels can express themselves, question, assert, challenge, defend, explore and examine their behaviour, motivations and practice when supported to become researchers in their field. Feedback has included: 'You're more likely to use something in practice when you find out for yourself' and 'Research is a good way of furthering knowledge and we have developed a culture of reflection. It has been eye opening to use this method and we now have more reflective practice.'

This article is an edited version of Piper L (2019) Creating researchful pedagogy for baby room practitioners in early years settings. Impact 5. Available at: https://impact.chartered.college/article/creating-researchful-pedagogy-baby-room-practitioners-early-years-collaborative-research-project/ (accessed 4 October 2019).

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What does great subject-specific professional development look like?

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We need to talk about how teachers become expert – not just at teaching, but at teaching across different subjects. All too often in education we get side-tracked by debates about issues such as high-stakes accountability systems, assessment reforms, recruitment and retention, anxiety about the breadth of learning experiences and funding. Even when we do remember that it is the quality of teaching that matters most, we tend to focus on the challenges, such as teacher recruitment shortages. Yet, as Professor Dylan Wiliam has argued, the biggest priority should be to 'love the teachers we have' by investing in their professional development and learning.

Our 2015review of research evidence(Cordingley et al., 2015) highlighted that subject-specific Continuous Professional Development (CPD) – by which we mean programmes which enhance teachers' subject knowledge and/or their ability to teach in specific subjects – has a greater impact on pupil outcomes than generic pedagogic CPD. Our more recent review for the Wellcome Trust,*Developing Great Subject Teaching* (Cordingley et al., 2018)focuses on how far teachers and schools across the UK are actually accessing subject-specific CPD, what this looks like at its best and the barriers that can get in the way. Worryingly, the review highlights that teachers in England engage in less CPD overall and are less likely to engage in subject-specific CPD than in most other high performing countries.

The big issues

We see the big issues that policy makers must address as follows:

Changes in curriculum and assessment policies are key drivers of demand for subject-specific CPD. But responses to such policy-driven changes are often limited to, for example, exam board briefings attended by one or two members of staff rather than extended professional development programmes. Policymakers have stopped the worst cases of exam boards selling CPD linked to their qualifications in recent years, but there is still more to do to raise the bar in terms of quality provision.

Perceptions shape expectations of CPD and how it is applied for subjects within schools. For schools where there is no established culture of high-quality, subject-specific CPD, and where external challenge and support for subject development is fragmented, there can be limited awareness of the potential for subject-specific CPD or of what "good" looks like. Such schools might have limited internal subject expertise on which to draw, on (for example, where staff retention is an issue). And, perhaps as a result of this, they can appear less confident in seeking out external expertise and challenge. Low expectations arising from low investment or poor provision establish a vicious cycle of reducing quality and resourcing. While teachers in England rate subject-specific or contextualised CPD more highly than generic pedagogic CPD, their leaders are less convinced – and both groups see it as much less common and desirable than do their peers in high performing countries.

Budgets and resources are consistently raised as the most significant challenge by teachers and leaders. Backfill costs for staff are an important consideration; they often significantly exceed the actual fees for an external conference, an invited speaker or consultant, or a professional development programme, especially if schools do the sensible thing and enable teachers to learn together.

Competing priorities for resources and attention are real, and lead to a desire for quick fixes. External accountability metrics dominate the minds of school leaders. New policy initiatives and demands, such as Prevent, call for staff development time too. Even where subject-specific CPD is prioritised, the pressure on time and resources can mean that schools adopt sub-optimal approaches, such as having one member of staff attend an external event and then cascading the learning to colleagues in a single twilight session.

Leadership: School leaders play a significant role in shaping how subject-specific CPD is prioritised, supported and integrated with other internal initiatives. Leaders – including middle leaders, heads of departments and senior leaders – also play a key role in enabling staff to participate in CPD and to implement what they learn from it, creating the necessary conditions for effective subject-specific CPD to flourish. Many school leaders do work to build strong professional learning environments and systems for developing depth in content knowledge at the heart of school improvement, as the case studies in the report show. But there is a long way to go to make this practice widespread. Effective leaders use performance reviews to identify and balance CPD needs for both the school as a whole and for individuals. Primary and secondary schools with a strong CPD offer and a focus on teacher learning through deepening subject knowledge work hard to sustain support and make it systematic; using different kinds of evidence and making sure there is a clear, logical connection between analysis of the needs of individual and groups of teachers, school self-evaluation, improvement and CPD activity. Offering teachers choices and ensuring breadth in the CPD offer are also common mechanisms for achieving a balance. CPD processes that make explicit space for teachers to pursue their own goals and experiences in light of their aspirations for their pupils, such as enquiry, coaching and lesson study, also help some schools to achieve this balance too.

School to school networks have become an increasing part of the school improvement landscape in recent years, particularly in England where Teaching School Alliances (TSA) and Multi-Academy Trusts (MAT) are supporting groups of schools. Some of these networks are developing strong subject networks across their member schools, and in some cases are supported by dedicated subject experts. But there is a long way to go to build this capacity so that all schools can and do benefit.

Why does it matter?

Perhaps we should finish where all good learning starts, by being clear about why subject-specific CPD matters. It isn't that we are saying that teachers don't know enough. Many do. But in a fast-changing world, subject knowledge grows rapidly and many teachers are being asked to teach beyond their own core interests and specialisms – especially, of course, in primary schools. We think the broader evidence shows us that by locating CPD in different subject contexts, we give teachers the opportunity to enrich their own and their pupils' learning. It helps them to consider

and make deeper links between subjects and the wider world. Opportunities to learn about, for example, metacognition through working on Thinking Through Geography or History as David Leat and colleagues at Newcastle University have advocated for years, creates powerful stepping stones into demanding pedagogies whose full potential is rarely realised. Contextualising CPD for subjects helps teachers explore the skills and capacities that subjects enhance and depend upon. Above all this kind of CPD helps teachers push beyond narrow assessment and exam requirements to work in ways that help them bring knowledge and subjects to life for their pupils.

This article is based on one previously published on the CUREE website at http://www.curee.co.uk/node/5033

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Lesson study: The Japanese approach to teacher professional development

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"For Japanese educators, Lesson Study is like air, felt everywhere because it is implemented in everyday school activities, and so natural that it can be difficult to identify the critical and important features of it."

Professor Toshiakira Fujii, Tokyo Gakugei University (Fujii, 2015)

In Japan, there are two different types of professional learning. The first is traditional learning through reading books or watching lectures or demonstration lessons. This can be used to develop the *knowledge* for teaching a subject. The second style of professional development is lesson study. Lesson study is used to help teachers develop the *expertise* for teaching a subject and is deeply rooted in practice. Lesson study is fundamental to how Japanese schools and universities improve classroom teaching.

Lesson study consists of groups of teachers deeply analysing lessons using an improvement cycle – a process of assessing the impact of teacher practice. This is a similar process to other forms of collaborative professional development aligned with adult learning principles utilised in high-performing systems, such as British Columbia's cycles of inquiry or the school improvement models of Ontario and Singapore (Halbert, Kaser and Koehn, 2011; Ng, 2003; Ontario Ministry of Education, 2011).

The lesson study approach

In Japan, lesson study occurs throughout a teacher's career, from in-school practicums during ITE, to teacher induction, to ongoing professional learning. Teachers learn the required steps to develop their teaching during ITE, which is continued throughout their career. Lesson study is nearly universal in Japanese schools, although its implementation varies (Lewis, 2016). In groups, teachers prepare a research lesson to meet goals for improving instruction. One or more teachers lead the lesson while others watch and collect evidence on student engagement and learning (Sims and Walsh, 2009). After this, a debrief discussion is held on what happened, how students approached the assigned task and how the lesson can be improved in the future. The purpose of the lesson study is not to refine a lesson to perfection but instead to deeply analyse a lesson in order to build teacher expertise (Takahashi and McDougal, 2016). A typical lesson study cycle takes at least five weeks – it is a slow and considered developmental process.

The key stages of Japanese lesson study are as follows:

01 Goal setting: Teachers consider long-term goals for student learning and development. They study the curriculum and standards and identify a topic of interest.

02 Lesson planning: Teachers select or revise a research lesson and write a detailed lesson plan that includes long-term goals; anticipated student thinking; data collection; a learning arc for the lesson; and a rationale for the chosen approach. Teachers anticipate potential problems in student understanding, questions students may ask, and how the teacher should respond. As part of this step, teachers much participate in kyouzai kenkyuu – the careful study of academic content and teaching materials.

03 Research lesson: Also called a demonstration lesson – one team member teaches the lesson while other teachers observe and collect data on student responses. Teachers from neighbouring schools can also be invited to attend the lesson.

04 Post-lesson discussion: In a formal post-lesson discussion, teachers share data from the lesson to illuminate student learning and identify issues related to the content, lesson, unit design, and instruction.

05 Reflection: The lesson is revised and sometimes a second round of lessons is held to address issues and improve instruction. Teachers document the cycle to consolidate and carry forward their learning, as well as formulate new questions for the next cycle of lesson study (Fujii, 2013, 2015).

Lesson study as a school-wide teacher development process

Seen as a whole school process, lesson study is how schools develop teachers and gradually improve instruction. It is not about making a single lesson perfect; instead, it is a process whereby teachers collaboratively and closely analyse how to maximise the impact of different teaching practices on student learning. Individual research lessons are part of a yearly, school-wide lesson study process that leads to the publication of an action research report.

In many schools, a broad lesson study research theme is chosen at the start or end of each year. The school then creates a schedule for lesson planning, with multiple research lessons to take place throughout the year (Chichibu and Kihara, 2013). Smaller

groups of teachers choose a more specific topic for study within the school-wide theme, based on an analysis of student learning needs (Jensen, Roberts-Hull, Magee et al. 2016). These groups of 4–6 teachers often specialise in the same content area or teach similar grades.

Lesson plans are sometimes presented to the whole-school staff for feedback (Stigler and Hiebert, 1999), and at the end of the year, teachers will often write an action research report that pulls together all of their learning, including a detailed lesson plan, summaries of their professional learning and questions to consider for future research lessons (Sims and Walsh, 2009). This school-wide improvement cycle involves frequent peer observation, mentor observation, research, feedback and collaboration. In this way, lesson study gives a structure to teacher professional learning communities in schools and ensures they are focused on student learning and improving instructional practice (Arani et al., 2010; Chichibu and Kihara, 2013).

Mentoring, feedback and advice from more senior teachers within or outside of the school is an essential part of the process. These 'knowledgeable others' contribute important insights during the planning stages as well as the post-lesson discussion. In Japan, the content of the curriculum is controlled by the Ministry, and textbooks are carefully screened to ensure that they have been written in line with the Ministry's guidelines (Tucker, 2015). As a result, through lesson study, teachers are able to investigate and utilise carefully designed curriculum materials to avoid 'reinventing the wheel', and actually add to the knowledge base (Takahashi and McDougal, 2016). Lesson study is also conducted across schools by subject research organisations, voluntary teacher groups, and in laboratory schools attached to major universities (Chichibu and Kihara, 2013; Lewis, 2016). National universities of education will often have affiliated schools that have lesson study sessions open to the public. Student teachers are able to observe these public lesson study sessions.

Building subject expertise in new teachers

The key feature of lesson study is its focus on the impact that the teacher is having on student learning. While planning for research lessons, teachers discuss how students might understand the topic and anticipate their approach to the task. This relentless focus on the students and their individual approaches to understanding the task is one of the key strengths of lesson study's design. By explicitly analysing and discussing student learning issues, teachers increase their own pedagogical content knowledge at the same time as refining lessons for their students (Jensen et al., 2016). Lesson study is designed to gradually build subject expertise across the entire teaching staff (Stigler and Hiebert, 1999).

Lesson study can increase teacher subject knowledge through a deeper understanding of student learning and of the impact of different instructional approaches. This can establish a cycle that slowly builds subject knowledge in teachers, leading to improved teaching and improved student outcomes. For example, when looking at different ways of introducing students to algebra, teachers analyse different approaches they might take, predict the different ways students can understand – and misunderstand – the key contents, and decide how best to address these issues. All of this takes teachers into deep pedagogical content knowledge, as they must understand the underlying mathematical concepts and the different ways in which these concepts are learnt by students.

This process is particularly important for new teachers, who might have graduated from ITE with strong content knowledge but with less understanding of how to apply that knowledge in the classroom. Lesson study allows new teachers to simultaneously develop and apply their instructional knowledge and skills. The collaborative nature of lesson study means that new teachers learn directly from more experienced peers. Consequently, lesson study is a key feature of the intensive teacher induction process in Japan. Lesson study is a powerful technique as it frames the unit of learning around a lesson. Teachers need to design and deliver lessons that improve student learning every day as part of their job. An effective lesson considers all the complexities of

teaching and produces an outcome of student learning. It requires both theoretical knowledge and practical expertise. Lesson study guides teachers (and candidates) through this complex process.

Teachers must design a lesson, which requires them to have the curriculum knowledge and analysis skills to prioritise learning goals as well as the content knowledge and pedagogical content knowledge to design the lesson tasks. To deliver the lesson, the teacher must be able to give clear instructions, set expectations, manage the classroom and dynamically modify tasks to respond to student needs. Finally, as part of lesson study, teachers must be able to reflect on their lessons, collaborate with colleagues and update their lessons to improve student learning.

This article is based on an extract from Learning First (2016) Working Paper: ***Developing subject expertise through practice: An example from Japanese teacher preparation and development.*** *Learning First.*

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EXTENDED CASE STUDY

Teachers' analyses of educational research as a source of professional development

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For many teachers, research in education has a bad name. There are at least two reasons for this. Firstly, it doesn't replicate well from school site to school site. Site variation is inevitably enormous, and thus research findings are affected by factors such as the experience level of teachers, the school's demographic and the quality of leadership at the site. A research finding of potential import based on work at a particular school site may show smaller effects or not work at all at another school. In fact, implementing a promising research finding may actually hurt students in the school that is trying to implement the research (Zhao, 2018). Because of this, I have argued that educational research is the hardest science of them all – much harder to do than physics and chemistry (Berliner, 2002). In physics, if you get an interesting finding in Milan, it is almost surely going to replicate in London. But if you get an interesting educational finding in Milan, there is no guarantee that it will work in any other Italian town, let alone replicate well in London or New York, for example.

Classroom teaching and the implementation of research findings are both strongly affected by *who* is in that classroom. Factors such as the percentage of girls in the class, the percentage of students whose parents have college educations, the percentage of English language learners, and so forth, are powerful determinants of the outcomes of classroom instruction. Practitioners are expected to use research findings that are not always generalisable, and those research reports never say anything about the contraindications. That is, research designed for teachers never comes with warning labels. Furthermore, if the research does not have the desired effects in the classroom, it is rarely the researchers or the research that is blamed – it is usually the teachers.

The second reason research in education has a bad reputation is because it is hard for teachers and administrators to understand, filled as it often is with measurement

formulas and statistics. This arcane language of researchers can render the useful and interesting parts of a research study indecipherable.

But these are not reasons to ignore educational research. They are simply reasons not to expect automatic replications or large effects when research studies are decoded and put into practice. As the respected British scholar Dylan Wiliam (2018) notably remarked: "Almost everything works someplace and absolutely nothing works every place." So, the results and application of research findings from journals needs to be filtered through teachers' and administrators' experience and sensibilities, and their understanding of their students, community and curriculum.

In journals, researchers frequently report "significant findings". But the term "significant" is related specifically to the statistics used. It means that under the conditions that a study was run, and for a given sample size, the findings favouring one group or one technique over another should be taken as confirmed. The findings appear not to be chance. But the actual difference between an experimental group and a control group on an achievement test, for example, may have been quite small. Thus, when trying out the research in the classroom – say teaching fractions in a certain way – the effects that are expected may not be easily noticed in a class of 25, although they appeared "statistically significant" in a study with 250 students.

Given that change is hard on teachers and the results of implementing research findings in a classroom may result in small effects, are ideas from the research community really worth taking seriously? Absolutely. Published educational research often suggests – although doesn't guarantee – that under some conditions, some educational practices are likely to result in improved outcomes that are valued. The experience and wisdom of teachers and administrators has to be invoked to decide the worth of the research brought to their attention, and their experience and wisdom needs to be used again to judge the effects of the research if it is implemented.

I think of it this way: a small gain in student attendance if teachers implemented findings from study A; a small gain in student achievement if teachers implemented research findings from study B; a small increase in positive relationships with students' parents if schools tried out ideas from research study C; and a chance to try something different even if it seems not to work, all afford opportunities for classrooms and schools to try to be better and do better.

Designing a programme to support teachers' use of research evidence

We have sought to design professional development activities that use research that *might* change classroom practice and *might* affect student outcomes in positive ways. And even if our professional development program did not affect practice or educational outcomes, it might still be worth teachers' engagement in these activities for the sense of competence and community that our program develops.

In designing our program, we took seriously William James's insightful statement: 'you make a great, a very great mistake, if you think that psychology, being the science of the mind's laws, is something from which you can deduce definite programmes and schemes and methods of instruction for immediate school-room use. Psychology is a science, and teaching is an art; and sciences never generate arts directly out of themselves. An intermediate inventive mind must make that application, by using its originality.' (James, 1983, p. 15).

We wanted to help teachers to more frequently be these 'intermediate inventive minds.' We also thought about Dewey's concern for teachers. He too was sceptical of the direct connection between research and practice. He noted in a major speech (1900) that those, like himself, who were promoting a scientific approach to education, needed to recognize that the teacher lived in a concrete social world, and were clearly not inhabitants of a scientific world, dependent as it often is on abstraction. Under such conditions, different world views about how to solve problems should be expected.

In that same speech, Dewey wondered whether it was ethical to have the educational scientist on the one side, acting as a legislator of behaviour, and the classroom teacher on the other side, following the orders from the scientist, as an obedient child might. Dewey wondered about the influential role most people wanted teachers to play in our society, and whether that could ever happen if the scientist were to dictate the behaviour of teachers. He asked:

'Can the teacher ever receive obligatory prescriptions? Can he receive from another a statement of the means by which he is to reach his ends, and not become hopelessly servile in his attitude?' (Dewey, 1900, p. 110)

We think we found a way to honour the thoughts of both James and Dewey. We found a way to promote those 'intermediate inventive minds' and to keep the researchers from prescribing to teachers. Our method requires three things: a small group of teachers who want to study a problem, an interpreter of research findings, and a place at which to meet.

We started interested teachers off with an introduction to the class size controversy – every teachers' concern – and helped them to understand the researchers' coded language (Casanova, Berliner, Placier et al. 1991). Simultaneously, we asked teachers at a school site about what else concerned them. From their concerns we picked topics for which we thought there was a research base. We would then search for articles addressing the issues they thought important, picking, say, 10-15 such articles. Then we would reprint the article on the left side of a wide page, and ask questions or make comments about the article in the additional space on the wide pages. Thus, research articles were annotated so that they could be read and understood by teachers.

For example, if teachers wanted to know about cheating in high stakes testing environments we would put together a collection of well-designed research papers on that subject. One of those research papers had this paragraph:

> *"To measure the instrument's levels of internal reliability, researchers collapsed the nineteen binary items into three constructs, as aligned with the taxonomy and defined in degrees of first, second, and third degree cheating. They categorized the first seven items in the first degree, the next seven items in the second degree, and the last five items in the third degree (see Appendix A). Researchers then measured internal consistency reliability using Cronbach's alpha. Each of the combined sections had a moderately high alpha coefficient (first = 0.70; second = 0.67; third = 0.83) indicating that the survey was reliable. The analysis resulted in alpha values close to or higher than the generally accepted 0.70 level (Cronbach, 1951). But it should also be noted that the instrument included only dichotomous, binary variables, which yielded lower bound, or underestimates of the instrument's reliability."*
>
> *(Amrein-Beardsley et al., 2010, p. 9)*

This is, of course, total nonsense to many classroom teachers. But in the extra space to the right of this paragraph from the article we would say things like:

> *"Researchers talk of their questionnaires as instruments. And they worry that their instruments will not yield the same results if they gave them more than once. They need instruments that will give pretty much the same results from one administration to another. That is, they seek instruments that are reliable. These researchers used a standard procedure for finding that out. It's a statistical analysis called Cronbach's Alpha which can be used to assess reliability. Alpha varies from 0 to 1.00. Here they find that each of the three sections of their questionnaire is reliable. The data obtained is trustworthy enough to interpret the findings which follow. Move to that section now."*

In another research report on the effects of different review procedures on testperformance the author said:

> *"The experiment featured a 4 (encoding) x 2 (after-lecture review) x 2 (before-test review) between-subject design. Thus, the design yielded 16 independent cells, each of which ultimately contained six subjects that had been randomly assigned."*
>
> *(Yu and Berliner, 1981, p. 11)*

On the right of the page we often explained such technical descriptions this way:

> *"These comments are for other researchers so they can replicate the findings, should they want to do so. Science depends on replications to gain surety about their results. You can skip this and the next few technical paragraphs and move on to the next section of the report where findings are reported. The experimental design used here is reasonable."*

So, a major requirement for this form of professional development is a translator of research reports on the topics that teachers want to know about. In our work, different groups of teachers wanted to know about cheating in high stakes testing environments, types and timing of reviews that help students do better on tests, homework policies for grades K through 9, effects of retention in grade, effects of preschool on student performance in later grades, and more. Translators of bodies of research in each area must be found.

The major requirement of this form of professional development is a small group of teachers (we recommend 5-8) that specify what they want to know more about – say homework policy – and are willing to meet regularly to discuss the research in that domain. The teachers used the translator-annotated research to interpret the articles in their areas of interest, using their teaching experience to make interpretations about the researchers' data and conclusions, and judging the pertinence of the findings to their particular school and classroom situations. This is where the wisdom of practice is honoured.

The third requirement is a schedule to meet, and a place to do so. In our experience this has been at different teachers' homes every other week over 4 or 5 sessions, or every other Friday after school in a nearby pub, until all the articles in a research area are discussed. We also requested that only teachers be invited to participate in these discussion groups, thinking that administrators could constrict the conversations. The conversations we monitored were often about family and work, which brings the teachers at a school site closer together. But the conversations were always about what actions might be taken given the new information they acquired (see Powell, Berliner, and Casanova, 1992).

Our goal was to use teacher wisdom and experience to interpret the articles in research areas that concerned a range of teachers – initial reading, bilingual education, discipline strategies, parent involvement, homework policy, early childhood education, etc. We tried to honour the concerns of William James and John Dewey. We didn't want to use research studies to force change. Instead, we sought to present the best research in some area in a comprehensible form to teachers, and to have teachers decide what was worth promoting and what was not. I mention homework policy because one of the teacher groups we worked with met over a few weeks on this topic. They digested and debated the annotated research we provided, and then they went to their school board and convinced them to change the homework policy in their school district, based on research evidence. Another group of teachers worked with their school board on class size – basing local policy on the findings from research.

There was one other finding from our enquiries into this form of professional development: teachers enjoyed the process. They met, talked, traded jokes, all whilst working on educational issues. This form of professional development improved both teachers' personal and professional lives, at costs that are far less than most other forms of professional development.

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CASE STUDY

Teachers' analyses of educational research as a source of professional development

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Embedding Formative Assessment (Leahy and Wiliam, 2013) is a two-year professional development programme consisting of all materials needed to run 18 monthly Teacher Learning Community (TLC) meetings of 75 to 90 minutes duration, together with videos of classroom practice exemplifying formative assessment practices, interviews with educators, administrators and students, and a variety of other relevant resources.

Through the EFA program, teachers are introduced to the five strategies of formative assessment proposed by Leahy, Lyon, Thompson, and Wiliam (2005):

- clarifying, sharing and understanding learning intentions and success criteria
- engineering effective tasks, discussions and activities that elicit evidence of learning
- providing feedback that moves learning forward
- activating students as learning resources for one another
- activating students as owners of their own learning.

At each meeting, each TLC member commits to trying out at least one strategy in their classroom, and a month later they report back to their peers on their experiences. Teachers are also encouraged to observe each other and give each other feedback on their development of formative assessment.

While the programme has been implemented in Australia, Singapore, Sweden, the UK, the US and Canada, there was only anecdotal evidence to suggest that the programme increased student achievement. Accordingly, the Education Endowment Foundation funded an evaluation of the programme in secondary schools in England by the National Institute for Economic and Social Research (NIESR).

NIESR's evaluation took the form of a pre-registered "intention to treat" study with 140 schools: half allocated at random to receive the EFA materials, and half given the cash equivalent of the cost of the materials (£295).

The measure of achievement used in the study was "Attainment 8". The Attainment 8 score is based on the student's grade in maths, English language, the three best grades in the subjects included in the English baccalaureate (science, foreign languages, history, geography), and their three best GCSE or equivalent grades in other subjects, with the grades for maths and English being double-weighted. In total, data was collected on 22,709 students in the participating schools who commenced their studies in September 2015 and took their GCSEs in June 2017.

After recruitment and randomisation, it was discovered that 16 of the recruited schools (12 treatment, 4 control) had already participated in the Teaching Effectiveness Enhancement Programme (TEEP), which included many elements of the EFA programme. To provide a fair evaluation of the programme, the NIESR evaluators therefore compared the Attainment 8 results of the 58 treatment and 66 control group schools with no involvement in TEEP. Students in the schools getting the EFA materials scored 0.13 standard deviations higher than those in the other schools (Speckesser et al., 2018).

To make sense of this figure, we need to estimate the progress made over two years by students in the control group. These students were 15 years old at the beginning of the trial, so one year's progress for students of this age is around 0.3 standard deviations (Bloom, Hill, Black et al. 2008; National Assessment of Educational Progress, 2013; Rodriguez, 2004; Andreas Schleicher, personal communication, November 14th, 2018). We also need to take into account attrition of student learning from the first to the second year of students' GCSE studies. Estimates of "summer learning loss" range from 10% (Cooper, Nye, Charlton, Lindsay and Greathouse, 1996) to 40% (Thum and Hauser, 2015), so an assumption of 10% attrition seems a reasonable lower bound.

Moreover, GCSE examinations are taken half-way through the summer term so the second year of the course is really only five-sixths of a year. Over the two years of their GCSE studies, students in the control group could therefore be expected to increase their achievement by

$$\underset{[Y10]}{03 \times 0.9} + \underset{[Y11]}{0.3 \times \frac{5}{6}} = 0.52 \text{ standard deviations}$$

Since the effect of the EFA programme over the two years was to increase student achievement by a further 0.13 standard deviations, this suggests that the programme increased the rate of student learning by 25%. Given that this increase is the average across all schools in the experimental group – not just those who implemented the programme with fidelity – this is an important finding. Given also that the additional cost of the programme is less than £1.20 per student per year, this suggests that it is highly cost-effective.

Furthermore, the fact that the EFA is a generic programme, which was delivered at scale with minimal support provided to schools, suggests that it has the potential to significantly increase student achievement in a sustainable way, within existing resource constraints.

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CASE STUDY

Helping teachers overcome barriers to research engagement

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As outlined by Goldacre (2013), evidence-based practice in education has the potential to not just improve outcomes for students, but also to increase professional expertise, confidence and autonomy. These are at the heart of our work at the Chartered College of Teaching. As Goldacre explains, evidence-based practice is not about telling teachers what to do; quite the opposite. It is about empowering teachers to make informed decisions for their contexts and students, using the best available evidence.

However, a range of factors prevent teachers from accessing the best available evidence. Research by Marsden and Kasprowicz (2017) on language teachers' engagement with research, for example, shows that the barriers to accessing research largely fall into the following categories: negative perceptions of research, lack of time and/or funding, and limited access to and understanding of research. The Chartered College of Teaching seeks to address each of these barriers to make research more accessible to teachers.

Funding

Original research articles are often hidden behind paywalls and can come with hefty price tags attached. In order to provide teachers with a wide range of original research articles, the Chartered College of Teaching offers teachers access to the world's largest collection of educational research through access to EBSCO's Education Source database. In order to support teachers with the selection of relevant reading, we also provide thematically curated reading lists. While teachers are not restricted to these lists and can browse the database independently, the lists provide them with a starting point for their engagement with original research articles.

Time

The most recent TALIS results (OECD, 2019) show that teachers in participating countries work an average of 38.8 hours a week; a number that is exceeded by twenty countries in the survey. This leaves little time to engage with long and complex research articles. However, Tripney et al. (2019) suggest that 'intermediaries' that

translate research evidence to make it more accessible are one of eight ways in which to engage teachers with research. Summaries published by the Chartered College of Teaching range from one-page overviews of broader theories such as cognitive load theory, to longer, in-depth discussions of specific issues. By offering a range of summaries that vary in length and complexity, we can support teachers at all stages of their research engagement journey.

Relevance to classroom practice

Research suggests that the readability of scientific texts is decreasing over time and that academic publications are becoming increasingly more difficult to interpret and critique by those outside the field (Plaven-Sigray et al., 2017). This suggests that even if teachers were able to find open access articles that are relevant to the problem they would like to address, the articles risk being highly technical, and their relevance to a classroom setting is not always obvious. The Chartered College of Teaching addresses this issue on two levels. Firstly, it offers online courses introducing teachers to research methods and design, supporting them in developing the necessary skills to engage with complex research articles. Secondly, the peer-reviewed journal *Impact* publishes reports of original research projects, case studies, teacher reflections and perspectives on research in more succinct, practitioner-focused articles that clearly discuss implications for the classroom.

Negative perceptions of research

According to Marsden and Kasprowicz (2017), a negative perception of research is the smallest hindrance to teachers' engagement with research, and only five per cent of teachers in their study felt that research was not at all relevant to classroom practice. However, 71 per cent of classroom-based teachers in their study felt that research was only 'somewhat' relevant to their work, so the benefits of research for practice may need to be communicated more clearly. This is why all resources from the Chartered College of Teaching include recommendations for the classroom, and encourage teachers to reflect on how they can apply research findings in their own contexts. Furthermore, the Chartered College of Teaching provides teachers with opportunities to participate in research projects in an attempt to address barriers between research and practice.

Collaboration

Research has shown that collaboration and peer learning are key elements of effective CPD (see Cordingley et al., 2015). Opportunities to collaborate around research are therefore firmly built into the offer of the Chartered College of Teaching. Teachers have the opportunity to engage regularly with their peers as part of online courses, during events and by joining regional networks. The research team is also developing a new teacher journal club strategy, providing teachers and journal club facilitators with the necessary tools to appraise the quality of research articles and discuss how findings apply to their own practice.

Overall, the Chartered College of Teaching aims to address the major barriers to research engagement that have been identified in the research literature, by providing access to original research articles as well as research syntheses and summaries for teachers at all levels of their research engagement journey. Through access to these resources teachers can develop the necessary knowledge to take evidence-based decisions in their classrooms and thereby increase their professional autonomy.

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Technology for teacher development

06

Harnessing the power of technology to support professional learning

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Introduction

In 2018, Education Development Trust completed a research study that captured what might be learnt from a selection of the world's most interesting examples of technology-assisted, in-service professional development, including wider reflections about the potential of technology to enhance the professional learning of teachers (McAleavy et al., 2018).

The backdrop to this study is the long-held concern for quality in education. The World Bank's World Development Report (2018) notes that a key component of improving the quality of education children receive is making teachers more effective. Improving teacher skill and motivation levels is a critical precondition for the achievement of better student learning, and high-impact professional development can improve teaching and learning.

Combining the power of technology with what we know about effective teacher development

The examples of technology-assisted in-service professional development we looked at in our 2018 research suggest that technology can help to offer high-impact professional learning for teachers. Several synthesis studies have been produced on research into how teachers learn. This body of research is an important starting point for reflections on the use of technology for professional learning. There is a degree of consensus between three influential synthesis studies (Timperley, 2008). Collectively, they highlight the need for:

- classroom-based expert coaching relationships
- the need for collaborative opportunities to process new professional learning
- sustained reflection over time

- approaches based on sound principles of adult learning
- adaptation of guidance to suite context
- subject-specific training opportunities
- exposure to models of effective practice
- recognition of difference between individual teachers and their different starting points
- the influence of school leaders
- teacher buy-in.

Professional development, when mediated by technology, can engage teachers directly and circumvent the often-cited weaknesses of off-site workshops and the indirect cascade model.

Technology offers the possibility of collaboration among communities of teachers who are dispersed geographically; it has the potential to connect distant experts with both face-to-face and virtual learning communities of peers, and it can be used to provide access to authentic examples of high quality.

Particularly promising technologies

Our research (McAleavy et al., 2018) suggested that mobiles, social media, SMS texting and video were seen to hold particular promise in connecting learning communities for professional development purposes.

The reach of mobile phones

In recent years, there has been increased interest in the possibilities provided by mobile phones as tools for teacher professional development, particularly in developing countries.

UNESCO has promoted mobile learning for teachers over many years. In 2012 UNESCO, in partnership with Nokia, published a series of five regional studies describing ways in which phones were being used to support teachers in Latin America, North America, Europe, Africa and the Middle East, and Asia (UNESCO (2012a; 2012b; 2012c; 2012d; 2012e). This series also includes a report by West (2012), which provides a global overview of mobile learning for teachers. For West the use of phones is situated in a context of global crisis in teacher recruitment and teacher development. The report highlights the particular potential of smartphones in two key areas: mentoring relationships that are informed by the sharing of video footage of practice and participation in formal and informal online professional learning communities

In 2017 UNESCO published a major study of teacher development enabled by mobile technology in four countries. Miao et al. (2017) make the case for a focus on mobile phones in the context of teacher development, identifying five headline reasons why mobile technology is so promising:

01 Many teachers […] already have them.

02 A mobile device offers an interface and functionality that is understandable to most teachers and other non-technical users.

03 Mobile networks now cover large areas of the world.

04 Mobile phones are dynamic communication devices.

05 Mobile phones can facilitate 'anytime and anywhere' learning. (Miao et al., 2017, p. 8-9)

Other organisations support the focus on mobile phones. The British Council (2015) presents the results of a survey of school teachers of English across six South Asian countries: Afghanistan, Bangladesh, India, Nepal, Pakistan and Sri Lanka. The report describes a situation of widespread access to mobile phones and frequent use of mobile internet among this group of teachers. The majority of teachers in the study had phones with mobile internet connectivity and they used them prolifically. The teachers were much more familiar with mobile phones than with personal computers and had broadly positive views of the potential of their phones for professional development.

Among the respondents, there is a clear positive sentiment associated with using mobile applications as a medium for English language learning and other forms of continuing professional development. The teachers reported that mobile can be an effective medium to a) access learning and teaching material on demand, b) interact with experts and other teachers and c) be part of a social community with common CPD [continuing professional development] goals (e.g. through the use of social media). (The British Council, 2015, p. 14).

The promise of social media

Researchers have in recent years begun to analyse the potential role of social media in teacher professional development. McCulloch et al. (2011) posit that social media presents an opportunity for teachers to take ownership of their professional development and for learning to be sustained by peer coaching more successfully than in traditional professional development. They also emphasise the ability of social media to facilitate cross-school working and collaboration beyond geographically based local networks, and for activities such as blogging to support reflective practice. A British Council study of teachers across six South Asian countries published in 2015 also reveals a high degree of engagement by teachers with social media. The study found that 64% of teachers across the six countries made regular use of Facebook, often through their mobile phones. This was the most popular social media platform but other platforms, such as WhatsApp, were also widely used. Encouragingly, a quarter of the teachers across the six countries who used social media reported that they were already using this technology to participate in professional interest groups with other teachers.

The motivational power of SMS texting

Two studies from Sub-Saharan Africa hint at the way mobile phones can be used for engagement purposes through texting linked to a wider professional development programme.

During 2012–2013 a pilot project took place in Ghana that involved the sending of regular SMS texts to 175 leaders who had previously taken part in a substantial programme of face-to-face leadership training (Swaffield, Jull and Ampah-Mensah (2013). This was part of the Leadership for Learning (LfL) programme which was a collaborative research and development programme that took place between 2009 and 2015. The project was designed by the University of Cambridge Faculty of Education. The SMS messages were based on the key principles of LfL and were intended to reinforce the understanding and engagement of the recipients. A qualitative internal evaluation suggested that school leaders found the messages extremely helpful as a way of maintaining momentum for change (Swaffield, Jull and Ampah-Mensah (2013).

In Malawi in 2016 RTI International made imaginative use of mobile texting as a way of seeking to provide teachers with guidance and encouragement in between formal, face-to-face training or coaching sessions. This intervention was part of a much more substantial programme known as the Malawi Early Grade Reading Activity, which ran from 2013 to 2016 (Kipp, 2017). The intervention was organised as a very small-scale Randomised Control Trial experiment: some participating teachers received

supportive text messages between face-to-face sessions while a matched control group did not receive the messages and simply received the face-to-face support. The SMS messages consisted of pedagogical reminders, classroom management tips, reminders about use of reading materials, training concepts and regular motivational messages. The participating teachers were tested for their understanding of content covered in training. The results showed modest but statistically significant score increases for the 'SMS group', with the teachers in that group better able to retain the information presented at the zonal training. The intervention was extremely cost-effective. A six-week campaign of sending 9,000 messages in total to 500 teachers cost in total just $743 (Kipp, 2017).

The influence of video

Polly and Hannafin (2010) highlight the power of video to provide models of effective pedagogies, as they bring concrete models of classroom practice and increase the likelihood that teachers will adopt new approaches. They stress the desirability of collaborative learning and identify the promise provided by online communities of practice. Several other authors highlight the particular potential of video technologies to enable teachers to reflect on their practice and to derive practical insights by observing the practice of others. Roth (2007) suggests that the value of utilising video in this context lies partly in the fact that it gives teachers a chance to reflect on their practice in a manner that is detached from the emotional involvement that features during and immediately after the lesson. Furthermore, Marsh and Mitchell (2014) emphasise the ability of video recordings of teachers' lessons to capture complex information about teacher performance that would prove difficult to convey through verbal representation, and to present a strong stimulus for group discussion and reflection. This builds on Borko et al.'s (2008)study into mathematics teachers' professional development, which finds that the use of video recording not only situates the professional development firmly within the teachers' own experiences but also engenders increasingly more in-depth and analytical collaborative discussion among teachers regarding effective pedagogy.

The importance of a blended approach

Despite the promise of these technologies, they are simply a mechanism to deliver, enhance and/or enrich professional development programmes and reach, possibly in a cost-effective way, teachers. There is evidence that highlights the importance of a blended approach to ensure that technology-assisted professional development is effective.

In 2013, Mary Burns documented an interesting experiment in Indonesia (Burns, 2013). Identical professional development content was delivered to primary school teachers in either an entirely online mode or different versions of a 'blended' mode, with combined online and face-to-face components. There was a high dropout rate in the exclusively online group and no dropout at all in the blended routes.

Course designers developed three variations of a web-based programme – a fully online, hybrid and web-facilitated model – and placed 20 learners, all with similar technology skills, in the three different models. The online cohort experienced a 31% attrition rate while 100% of learners in the hybrid and web-facilitated models completed the programme. Data collection revealed that the greatest factor impacting attrition or persistence was the absence or presence of face-to-face interaction with the instructor and colleagues. (Burns, 2013)

This study from Indonesia is consistent with the view that exclusively digital learning is less likely to be successful than professional development with some element of face-to-face engagement. This contention is supported by the findings on learners participating in exclusively online MOOCS, for which many studies have indicated very poor completion rates. Burns and Lawrie (2015) reinforce the case for blended learning in the context of low-income and fragile states. Teachers ideally need blended learning:

ICT is a complement, not a sole solution. What it cannot do is replace professional

face-to-face contact, instil quality where none exists or solve the human and institutional issues that bedevil fragile contexts. (Burns and Lawrie, 2015, p. 132).

The concept of 'flipped learning' takes thinking about blended learning a stage further. Flipped learning has largely been discussed in the context of student learning but is clearly relevant also to adult professional learning. Face-to-face training or coaching sessions can be enhanced, in a particularly cost-effective way, if teachers are able to engage with digital resources before the live sessions.

Lessons from failure: technical, institutional and attitudinal barriers to success

While there are grounds for optimism about the role of technology in teacher development it is also important to learn from projects that fail or are only partially successful.

Boitshwarelo (2009)describes an experiment in the use of online collaborative learning for secondary science teachers in the context of Botswana. This intervention was not successful. The participants were initially enthusiastic but technical problems and pressure of work led to the collapse of an embryonic virtual community of practice.

Failures such as this can be instructive – and there are many reasons why technology-enabled interventions in schools sometimes fail. The causes of failure, as in the Botswanan example, can include resourcing problems, institutional factors and attitudinal issues.

Many technical issues can undermine the application of technology. The potential return on investment in technology can be greatly reduced if hardware is not properly maintained. Connectivity problems make online learning difficult. As Miao and colleagues pointed out in 2017, even the much-vaunted advantages of mobile phones often prove elusive in practice because of technical problems:

Not all teachers knew how to use mobile technology; mobile networks were less reliable than initially assumed; getting teachers to actively engage with new services was often a struggle; paying for teachers to access specific mobile content was logistically and technically complex; operating systems and other technical specifications varied enormously; and mobile technology changed so quickly that educational services developed for hardware that was relevant when a project began were not as relevant when the project ended. (Miao et al., 2017, p. 9-10).

Although mobile technologies have the potential to extend dramatically the reach of teacher professional development programmes, particularly in low-income countries, owing to the rapid proliferation of mobile and computer technology, it is important to note that ownership of such technologies is far from ubiquitous and wider infrastructure issues need consideration (Miao et al., 2017).

Institutional and attitudinal barriers can also reduce the effectiveness of technology-enhanced professional learning. Thang et al. (2010) summarise some of the characteristic barriers to the successful implementation of technology-assisted teacher professional development in their analysis of the barriers that hindered attempts to create online collaborative learning environments for teachers during the Malaysian Smart Schools Initiative. The Malaysian Smart Schools Initiative was a project initiated in 1997 to raise educational standards by integrating ICT throughout Malaysian schools. Low utilisation of the technologies as a result of difficulties in engaging teachers and improving their technological literacy led the Ministry of Education to introduce the e-CPDelT Vision 2020 project, which aimed to improve teachers' ICT skills and create communities of practice through online professional development.

Thang identify some of the difficulties involved in the establishment of a viable virtual community of practice among a small group of teachers using an approach supported by online communications.

It is apparent from the findings that teachers involved in the study faced several barriers in adopting the online tools…The 20 teachers in this study were definitely not ready for it…These teachers constantly have to juggle with teaching responsibilities, administrative work and co-curricular duties. On top of that, they have to worry about their students not performing well in public examinations. Thus, it was not surprising that the teachers lacked interest and motivation to experiment with new methods of teaching. (Thang et al., 2010, p. 412).

The problem here was related not so much to the reliability or appropriateness of the technology but to the human factor. The teachers were not confident about the use of the technology. There was a fundamental misalignment between the model of better teaching promoted via the training and teacher perceptions of the teaching styles needed for students to do well in tests. The teachers also lacked the support of and endorsement from school leaders. The online community of practice gave teachers opportunities to comment on the practice of others. Some teachers were reluctant to provide developmental feedback (Thang et al., 2010).

Even when the technology is available and reliable, changing teacher behaviours remains difficult (Schweisfurth, 2011). Designers of programmes of technology-enabled professional development need to consider both how technology might be utilised to improve teacher performance and how teachers can be supported and incentivised to make the best of the enhanced learning opportunities. A risk analysis is required to reduce the possibility of failure. Risks requiring mitigation in any technology-enabled professional development approach will almost always involve:

- potential technical problems
- alignment with other initiatives
- endorsement by school leadership and other influential people
- workload issues
- ensuring teacher 'buy-in'.

Hope for in-service training and professional development

Experience from high-income countries shows that practicality, specificity, and continuity are key to effective teacher professional development. Practicality means teachers are trained using concrete methods as opposed to theoretical constructs, and the training is classroom-based. Specificity means teacher training programs are most effective when they teach pedagogy specific to a subject area (say, how to effectively teach a mathematics class). Continuity means teachers receive significant continual support – not one-off workshops. (World Bank, 2018, p. 132).

Technology has huge potential to enhance professional development in line with this analysis, with its focus on ***practicality, specificity and continuity***. Learning can be given a ***practical*** quality, through, for example, the sharing of cost-effective videos that show promising practice in authentic settings. Mobile technology makes a range of school-based learning possible, which we know to be more powerful than traditional off-site workshops. Purposeful reflection about ***specific*** subject-related pedagogy can be enhanced by giving teachers access to comprehensive digital resources related to particular aspects of the school curriculum. Technology can provide cost-effective ways of supporting coaching relationships and professional learning communities so that professional development takes place within a framework of ***continuous*** and sustained reflection.

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CASE STUDY

Anyone, anytime, anywhere: Using MOOCs to support teacher education

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MOOCs (massive open online courses) allow anyone, anywhere, to access high-quality learning materials via online platforms. With a rise in online learning, and a growing recognition of how this can support continuing professional development (CPD) in the education sector, in 2016, the Girls' Day School Trust (GDST) ran its first course with online social learning platform FutureLearn. More than 8,000 learners joined the first run of our teacher CPD offering, focused specifically on educating girls, including over 230 of our own GDST staff.

A key aspect of our MOOC production cycle was ensuring that it was aligned with criteria identified as being effective for teacher CPD (Cordingley et al., 2015). Some of our key guiding principles are outlined below.

- Effective CPD includes content highly relevant to its participants, their day-to-day experiences and their aspirations for their pupils. One of the particularly popular aspects of the MOOC was access to authentic learning experiences, which we included by using lesson footage from schools from across the GDST. We also ensured that we included pieces to camera from students, reflecting upon their own experiences, to emphasise the importance of student voice and add validity and authenticity to the content of the course.
- CPD content needs to reflect the wider social/educational context. The MOOC included a variety of voices from the education sector as well as linking schooling and attainment to the world of work and current debates such as the gender pay gap.
- Impactful CPD builds a sense of common purpose and community. We chose to host our course on FutureLearn, which has particularly strong and intuitive social learning features built into the platform, which in turn help to foster discussion and nurture debate.

- Teachers who undertake successful CPD implement what they have learnt in the classroom. At the end of each week there were takeaway activities and self-evaluation tools for practitioners. From the qualitative feedback data collected, it is evident that the MOOC prompted learners to reflect on current practice and experiment with new ideas in the classroom.

Reviewing our MOOC

During the three course runs, over 14,000 learners joined the MOOC, with an average completion rate of around 20 per cent. The focus on completion rates as the main mechanism used to evaluate the success of MOOCs fails to appreciate that, for many learners, MOOCs are not 'merely destinations' but provide 'grounds for future opportunities' (Ahearn, 2017). Many open courses, the GDST's included, release all video content as downloadable take-aways, along with infographics and a host of classroom-based activities and self-evaluation tools. The repurposing of this material, and its use in offline activities, isn't captured through online statistics but could arguably be one of the most valuable aspects of the courses for practitioners. From our post-run survey, 92 per cent of respondents said that it met or exceeded their expectations to add a fresh perspective to their current role.

Another important take-away for learners was the interactions that they had with mentors, with real-time and ongoing facilitation offered throughout. We found that engagement with content significantly increased when teachers saw 'mentor' comments in discussions that offered advice on follow-up resources, challenged particular perspectives or simply offered reassurance on particular pedagogical approaches. This underlines the importance of building a sense of common purpose, mixing theory with practice and ensuring that time is built in for discussion and review.

As one learner commented:

> *This course really made me think about my role as a teacher… The videos and articles are well chosen to promote reflection and interaction with fellow educators. It was most rewarding to share ideas and experiences with colleagues from a variety of contexts which underline the fact that the experiences we share are far greater than any local differences might suggest.*

After running the course three times, we identified that the content and structure needed a more substantial review. Gender in education, female representation in the workplace and gender equality are huge topics, and ones that can be approached from a variety of angles. The diversity of our audience also led to changes, as we were keen that we were supporting parents, as well as educators, in this space and, perhaps most importantly, facilitating meaningful dialogue between the two. As part of the review process, the weekly workload was cut, making it more manageable for teachers to engage, and we sourced new contributors for much of our content to make them more representative of the diversity of the profession.

Considerations: MOOCs for teacher CPD

- MOOCs can offer the 'best of both': a more flexible approach to CPD but also a community of learners with shared aims and motivations, a key ingredient to successful CPD programmes.
- MOOCs can be powerful tools to build a sense of common purpose. Courses that include study room activities and peer review help to create communities of practice and shared understanding, whilst representing a range of opinions from a diversity of voices.
- MOOCs can be an important way for external bodies to support the teaching profession – for example, through summarising research, raising aspirations and partnership building.

- MOOCs can cater for a variety of levels of experience and engagement with subject matter –an acknowledgement that not all teachers will be starting their professional journey from the same place.

For more information about GDST's online learning courses please visit: *https://www.futurelearn.com/partners/girls-day-school-trust.*

This article is an edited version of Icke A (2019) Anyone, anytime, anywhere: Using MOOCs to support teacher education. ***Impact*** *Special Issue. Available at: https://impact.chartered.college/article/anyone-anytime-anywhere-using-moocs-support-teacher-education/ (accessed 4 October 2019).*

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EXTENDED CASE STUDY

Knowledge sharing through digital tools

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This article considers new possibilities for how digital tools can be used to enable online knowledge sharing as a form of continuing professional development (CPD) for teachers; explores some of the challenges involved; and exemplifies how this idea works in practice through the MESH (Mapping Educational Specialist knowHow) project.

Challenges in a knowledge base for teaching

Our analysis is that technologies offer the teaching profession the opportunity to revolutionise the way knowledge is held and constructed – by the profession and for the profession – but that there is a challenge here in how to guarantee quality, relevance and coverage. The authors estimate that were it to exist, a comprehensive pedagogic knowledge repository for the teaching profession, covering the teaching of key concepts in specific subjects for the whole range of learner needs, might contain tens of thousands of entries based on the core concepts for teaching covered in the indexes of educational texts like Capel et al. (2019) being multiplied by the number of different subjects, phases and contexts in which the concepts might be applied. Even Shulman's simple articulation of the different forms of knowledge for teaching (Shulman, 1987) illustrates the breadth of knowledge involved in teaching (see Table 1).

However, we need to not only consider how we might access such a knowledge base but also to consider the origins of the knowledge for practice in these fields:

General Pedagogic Knowledge	i.e. the broad principles and strategies of classroom management and organisation that apply irrespective of the subject.
Subject Content Knowledge	i.e. research based knowledge generated by specialist research units in genetics, literature etc.
Subject Pedagogic Knowledge	i.e. the knowledge of what makes for effective teaching and deep learning of concepts in specific subjects at specific ages for particular learners.
Technology Pedagogic Knowledge	i.e. general and subject specific pedagogic knowledge about how to deploy technologies to support learning of concepts in specific subjects at specific ages for particular learners.
Curriculum Knowledge	i.e. the materials and the programmes that serve as 'tools of the trade' for teachers and which ensure progression in learning over the years.
Knowledge of Learners and their Characteristics	i.e. knowledge of child development from psychology, sociology, and neuroscience.
Knowledge of Educational Contexts	i.e. cultural knowledge which impacts on schooling.
Knowledge of Educational Ends	i.e. purposes, values and philosophical and historical influences: both short and long term goals of education and of a subject.

Table 1: Forms of knowledge for teaching (developed from Schulman, 1987)

who is responsible for updating the knowledge? What is its source? A lack of robust underpinning evidence in the teaching knowledge base creates a number of potential risks, including:

- where good evidence is not available, bad evidence is used instead to inform practices (Saussois, 2003)
- shortcomings in the knowledge base mean that teachers may justify practices by falling back on tradition, prejudice, dogma or ideology (Hargreaves, 1996)
- a lack of a clear knowledge base perpetuates the misconception that any intelligent person can be a teacher (Fullan, 1993).

Fullan further argues that 'a key obstacle in the evolution of teaching as a profession is an inadequately defined knowledge base about teaching and teacher education' (Fullan, 1993, p. 113).

Whatever form of CPD we are considering, the research and evidence base underpinning the CPD may not be explicit and indeed, in some cases may not even exist. However, the issue can be particularly evident in online CPD. We use the term 'online' CPD to refer to both formal courses and self-directed CPD, where teachers

are acquiring new knowledge passively through reading, listening to or viewing online content; or actively through personal professional networks such as via subject association networks and social media. Digital technologies offer the opportunity for teachers virtually anywhere in the world to be able to access online CPD materials. But the lack of quality assurance and an evidence base is more apparent in online materials than it is in face-to-face CPD, where the spoken word is often ephemeral.

Online repositories of articles

Even where CPD resources consist of repositories of articles, podcasts or videos that *are* underpinned by evidence, they are not the full answer to keeping teachers up to date. Such repositories abound, for example the USA's ERIC (https://eric.ed.gov/pdf/ERIC_Retrospective.pdf) which provides open online access to articles. Professional associations and teachers' councils also usually provide members with online access to articles (www.subjectassociations.org).

However, UK government-funded research (Leask 2004; Leask and White, 2004) found open access to academic articles was not particularly helpful to teachers for a number of reasons, including:

- academic articles are not written for a 'user' audience as they have to conform to particular protocols to provide a foundation for further research
- there is a massive oversupply of articles in some areas. See, for example, the UK Government's commissioned systematic review of research on primary modern foreign language pedagogy (Driscoll et al. 2004). Reviewers found 5,184 potentially relevant articles. How does a teacher decide which to read? Few articles were found to be relevant.

Other challenges in online CPD and knowledge sharing

There is a further risk, too, in terms of the long-term availability of online CPD. In the early days of the development of internet hosted resources for teachers, a number of governments invested heavily in online CPD resources (EdNA in Australia; the QCDA, TDA, BECTA, DfE resources in England). Teachers then found changes in government meant resources were taken offline. Colleagues in Sweden and Scotland have reported similar actions. Not only is this a significant waste of government funds but curricula were built around the resources, and not just in the originating countries. South African colleagues reported that UK government-funded National Curriculum resources which they had been using vanished overnight with no warning. A lesson for the education sector is that where governments want resources developed, the resulting resources need to be protected from destruction.

A final challenge in online learning lies in how to recognise CPD that is undertaken. Some governments already require teachers to demonstrate that they are undertaking CPD in order to retain their teacher registration, and many other professions already operate self-managed CPD 'points' systems independent of government. Self-directed CPD through reading research papers, watching videos, and attending online and face-to-face seminars are widely recognised by other professions as providing CPD (Royal College of Surgeons, 2018).Such an approach might be valuable for teaching, too.

Digital networking and the creation and validation of new knowledge

The process of creating, validating and sharing new knowledge was transformed by digital technologies. From the early 90s there were successful experiments in education, networking researchers and teachers worldwide to share and build knowledge. In 1992, MirandaNet – an international knowledge sharing network of ICT innovators in education – was established to share practices internationally. The MirandaNet Fellowship is now partnered with the professional association Technology,

Pedagogy and Education (www.tpea.ac.uk). In 1996 the UK government agency, Becta, established a SENCO forum which is now managed by volunteers by the professional association NASEN. These initiatives showed the power of online networking for knowledge-sharing across national boundaries.

Fifteen years ago, the UK local government sector – which has around 600 specific areas of responsibility – developed online communities of practice to network local authority specialists across the four home countries. Users now come from 80 countries. Members of the communities benchmark practice, share and develop new practices, and induct new colleagues into the shared knowledge of the network (KHub.net). The health sector also has long-standing collaborative online knowledge services such as the Cochrane Collaboration (www.cochranecollaboration.org) and the National Institute for Clinical Excellence pathways (https://pathways.nice.org.uk).

Knowledge and practice therefore exist, showing how internet connectivity can be utilised to support the rapid exchange and testing of new ideas between teachers and researchers regardless of their location, followed by rapid publication and dissemination. Access to knowledge for self-directed professional development can be supported cost-effectively by personalised online CPD processes. For example, at the beginning of the school year, if teachers find they have students with specific individual needs, the online SENCO forum provides a first port of call for discussion with peers. Some teachers use Twitter for similar purposes but there is a risk around reliability with any service that allows content to be posted by anonymous users.

Whilst there is much to commend, there remain challenges to this approach reaching its full potential. Many professional networks exist but there is no central register or co-ordination which would help new teachers to find online professional communities. Smaller countries may not always have the resources to have specialist subject associations which typically run specialist networks. The sharing of knowledge generated around the world, rather than only within national boundaries, has huge potential to help keep professionals up to date. In the education sector, it appears that the lack of a dedicated body providing central organisation has left the education sector ten years behind in access to what are now considered basic digital tools to improve the quality of professional practice (Younie et al. in Hudson et al., forthcoming).

Imagining online CPD in the future

Tried, tested and low-cost, today's online resources, apps and courses typically use web publishing linked with two-way online communication tools. The availability of these is taken as given. We look beyond this basic provision and can imagine a world where class teachers periodically receive a text with links to brief summaries about new and substantial research relevant to their classroom practice and challenges. Such a knowledge service would provide summaries which were quality assured, authoritative with authors known, where alternative viewpoints were acknowledged, and where advice would be weighted for strength of evidence and transferability.

These CPD resources might be presented as podcasts, video, texts, interactive resources, simulations – whatever is appropriate to the topic and would be accessed through different devices. Through our experiments with how to summarise research to create the knowledge needed for teaching, we have found that the pedagogical applications of new knowledge created from years of research can often be very simply expressed – sometimes in a few sentences. In addition, these can easily be incorporated into a teacher's existing professional practice.

In such a world, parents, teachers and learners would all have access to research summaries about the barriers to learning key concepts that individual children face, and so could use these for planning interventions. Subject content knowledge experts, such as neuroscientists, would work with expert teachers to translate research findings into practical classroom applications, publishing a summary which at the touch of a button could be translated into many other languages.

Expert teachers would be part of specialist national and international teacher-researcher/researcher networks, creating new research-based pedagogic knowledge, benchmarking data and practices and sharing the results with colleagues where such networks would publish and update summaries developed cost effectively using online communication and collaboration tools.

In this world, high quality resources covering all lesson subject content, such as those developed by Open Universities around the world, would be freely available to subject specialist teachers to support their self-directed CPD and professional updating. Personal video analysis of practice would be undertaken routinely as part of professional development and practice refinement coupled with personal, perhaps online, mentoring available, in the style of the existing IRIS Connect model.

This world is within the grasp of those entering teaching now through existing digital tools. But individual teachers and schools cannot realise this vision alone.

Knowledge sharing in practice: The MESH (Mapping Educational Specialist knowHow) experiment

The authors of this paper have been involved in experiments with digital technologies to support lifelong teacher learning since the 1980s and have, with colleagues around the world, developed a prototype knowledge mobilisation system to address the criticisms of knowledge management in the education sector. The system is called MESH – Mapping Educational Specialist knowHow.

While the UK had extensive open online educational resources for CPD prior to 2010, the websites where they resided were closed down following a change in government. In the years that followed, the authors and a network of colleagues consulted with teacher and teacher education colleagues about online CPD provision from countries as diverse as the USA; Thailand; Pakistan; Bhutan; Malaysia; Cameroon; the Czech Republic; New Zealand; Australia; Afghanistan; Croatia; Poland; Ecuador and South Africa. They found that colleagues faced similar problems about the lack of research and lack of access to usable knowledge. There was a willingness to work together to address these problems.

We also consulted with OECD and UNESCO colleagues, and have found no organisation with a remit or the capacity to focus on building and making public the knowledge base underpinning educational practice. (Note: this is not the same as giving teachers open access to research articles).

Here are some points of consensus that developed from the consultation:

- No initial training can provide teachers with the knowledge needed for teaching over a whole career. In both developed and developing countries, there appears to be a consensus around initial teacher training models: three or four years of training with concurrent teaching of pedagogy and subject content training, or a 3+1 model in some countries, such as Finland which also requires Masters level training (this was proposed in England in 2008).

- However, in times of teacher shortage, standards for entry are usually dropped. This means that CPD provision cannot be based on assumptions about what teachers already know, and supports the case for self-directed CPD to be organised. We propose that integrating ITT and CPD online provision with CPD 'points' type accreditation could provide a continuum for professional learning. Teachers who are members of the Royal Society of Biology, for example, already undertake self-directed accredited online CPD. Given the pace of change in different subject disciplines, (including pedagogy, neuroscience, psychology and so on) keeping teachers up to date is a significant challenge.

- Knowledge resources need regular updating.
- A-Z lists of research summaries are needed, that provide an overview of the field and are produced specifically for teachers. These should be accessible at the touch of a button and regularly updated.
- Small changes in publishing practices could lead to the production and updating of such research summaries.
- Other professions with similar knowledge services provide funding models that educators could follow.

The MESH experiment (Hurley 2019; Younie et al., 2019) combines online collaborative knowledge building models with 'translational research' publishing models to create prototypes of new ways of working, to provide up-to-the-minute CPD materials. Examples have been developed with:

- regional/local networks with university, school and local authority staff working together
- specialist research institutes
- professional subject associations
- Non-Governmental Organisations (NGOs)
- PhD supervisors and their students, via a national validating group.

As a result, we founded a knowledge mobilisation and knowledge exchange system called MESH, Mapping Educational Specialist knowHow; subsequently developed by the network to experiment with ideas around knowledge mobilisation. In 2018, an international advisory council was formed with colleagues from the countries above, to share knowledge across different countries. What is now called the MESH knowledge mobilisation system focuses on networking teachers and researchers to bring together and keeping updated syntheses, summaries and knowledge maps of existing research-based knowledge.

A sixth model, coordinating the work of expert teachers as change agents, is the next development. We argue that such a network of teachers would lead to a dynamic and agile sector, able to respond rapidly to change, with actions supported by research. Lesson study and action research provide the foundation for what we envisage.

In order to build the pedagogic research base for CPD across all subjects and concepts, and for every type of learner, we propose the following as necessary: online networking; supporting peer research; collaboration; and scaling up of promising small-scale research. But we also suggest that these ways of working are incorporated into normal professional practices for nominated staff. Funding from external bodies seems rarely to support sustainability, as practices stop when funding stops. If enough leading educators adopt a self-improving professional stance then these ways of working might achieve the prize of a global, research-informed knowledge base for the teaching profession which can be updated regularly and is free at the point of access: the vision of the MESH international network. Prototype MESHGuides have been accessed in 199 countries with no publicity spend: knowledge of the resource has been through word of mouth between educators.

Conclusions

Online CPD means that no longer is a teacher or school tied to a local provider. As long as the school has internet access or access to tools to provide offline provision, no longer does the remoteness of the school mean CPD is not available to staff. With the ability to automatically translate over 80 languages via Google Translate, no longer is language of publication the major barrier it once was to accessing knowledge.

Digital technologies support teachers' open access to online research summaries as well as their networking communities, to build a research knowledge base that can be accessed at the touch of a button. Thus, digital technologies support self-directed personal professional development. Not only could online CPD be free at the point of contact for the teaching profession but the resources could also be open access for parents, learners and other stakeholders anywhere and translatable with ease.

In the scenario of ubiquitous international connectivity, the quality of the knowledge accessed through online CPD could be genuinely world-leading. We are not suggesting that there are universal truths but that through technology, access to world-leading knowledge is possible. Alternative viewpoints and emerging knowledge can be easily included so that a teacher can weigh up the evidence before making a decision about their practice.

However, our research indicates that no one country working alone is likely to be able to coordinate the resources necessary to realise the opportunities for online CPD. The knowledge base for teaching is just too extensive, with pockets of new knowledge being developed in research units, NGOs, research funder repositories and universities across the world.

So, what is to be done to realise the vision? Doctors and engineers do not wait for somebody external to their profession to organise the knowledge base for them: so why should teachers?

But who is to lead?

Acknowledgements

Parts of this paper are adapted with permission from:

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Social media and reflective practice – a world-wide support network

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It could be argued that all educators engage in some form of reflective practice when thinking about planning and assessment. What is not clear is whether teachers are finding time to reflect *deeply* – to think *deliberately* and *purposefully* about the learning they facilitate. With time a precious commodity, and new technology an ever-increasingly available tool, teachers are potentially seconds away from a wealth of intelligence that stretches far beyond the walls of the classroom. By highlighting the limitations of traditional theories around reflective practice, it is possible to consider the benefits offered by new technologies. Social media can give educators access to perhaps the widest and most responsive support network that teaching has seen to date.

Reflection with an audience

Dewey (1933, p. 9) highlighted perplexity and doubt as 'certain sub-processes' that are key to reflective practice. However, a common criticism of existing models of reflective practice is that they suffer from introspection and undervalue the experiences of others. Incorporating reflection into teacher training can be challenging, as a learner could present as 'not conducive to the questioning of experience' (Boud and Walker, 1998, p. 192). Expressing vulnerability, through exploring weakness, is difficult when being assessed. This contradicts Schön's (1987) ideas about reflection with a more experienced 'coach'. Galea (2012) highlights the establishment of ideal teacher competences as a restricting factor, warning that 'reflective practice has become engulfed in systems of performativity' (p. 248).

Collaborative reflection

The opportunity for collaborative reflection amongst educational professionals can be facilitated by social media streams such as Twitter. Burhan-Horasanli and Ortactepe (2015)note that technology is becoming more prevalent in its use for teacher reflection, and Conole et al. (2011, p. 121) comment on the shift from static, knowledge-led internet spaces, to interactive, user-generated content that enables 'peer critiquing, sharing, personalisation and adaptation'. Considering White's (2013,

p. 42) claim that teachers are as 'isolated as in Dewey's day', it is evident that social media could tackle this detachedness by uniting teachers with other professionals.

Reflecting collaboratively is not a new concept (Schön, 1987). However, 'others' are usually work colleagues, and belonging to the same institution could be argued as a limitation here. Valli's (1992)model of reflection suggests that practitioners collect and consider a range of viewpoints in order to ensure that their reflections are not 'inward looking'. However, the likelihood is that these viewpoints, unless provided by professional conferences or school partnerships, are gathered from within the practitioner's own environment. Given that teachers are often influenced by the institution within which they practise, reflections can become biased. Social media channels, providing opportunities to make connections with educational experts from diverse backgrounds, could help to balance factors influencing personal reflections.

Unfortunately, exposure to a varied collection of opinion is not as simple as 'following' educators on Twitter or Facebook. Aronson and Dron (2014) acknowledge that, like any form of social circle, a person may choose the individuals they 'follow', and these self-constructed digital networks could restrict diversity.

Diverse collaborative reflection

Collaborative reflection less influenced by personal values is possible by engaging with the hashtag function when using Twitter. By interacting with Twitter chats, it is possible to 'focus solely on interests' (Aronson and Dron, 2014, p. 381), meaning that participants connect in an 'affinity space' (Gee, 2005, p. 214): a space where a wide range of individuals consider a common interest, with differing standpoints. Weekly chats, hosted by educators, see teachers from around the world come together to discuss pertinent topics. It is for this reason that Twitter might be likened to professional conferences. These chats are organised through the use of an agreed hashtag, such as #edchat, #edtech or #primaryrocks, meaning that users can search and filter content easily, even after the 'live' chat has ended. There can only be value in encountering multiple perspectives when the resulting dissonance serves to deepen reflection. Mezirow(1998, p. 7) agrees, noting that the 'more interpretations of a belief available', the more likely a dependable solution will be reached.

Reflection 'in the midst of it'

Collaboration using social media could be supportive both in furthering reflections or in preparing for future action. However, Schön (1983) also writes of reflection *during* action. 'Reflection-in-action' (Schön, 1992) involves assessing events as they occur and acting immediately. Of course, when 'in the midst of it' (Schön, 1983, p. 68), valuable reflection opportunities may be limited, and using social media during teaching would be problematic. However, other forms of technology can help by recording the snapshots of learning, or misconceptions, that might otherwise be missed. For example, Classflow and Seesaw, amongst other tools, facilitate easier and more frequent communication between teacher and learner.

University-based vs. practice-based training

Practice-based training is becoming a popular option for trainee teachers. Schön (1992, p. 125) believed that developing the skill of reflection-in-action is a crucial component of 'the artistry of competent practitioners', so this method of training perhaps best prepares students, giving them additional practical experiences to draw on for reflection. However, the Carter Review (Carter, 2015) acknowledges the importance of supporting teaching as an evidence-based profession, which arguably relies on academic study time. While it has been suggested that social media is not conducive to academic study (Mahrt et al., 2014), others argue that it has the ability to empower individuals through its offering of collective intelligence (Gee, 2004). Mahrt et al. (2014) discuss the tendencies for academics to share open-access research and resources through Twitter, and note the speed with which new papers are circulated.

Although trainees may gain extensive practical knowledge (Schön, 1983) through work-based training, they may lack the opportunities afforded to university-based

students to collaborate with peers and professionals. Social media can connect users to a diverse network of professionals: from teachers, headteachers and senior lecturers, to Ofsted inspectors and educational politicians. It may be beneficial for practice-based students to engage with online blogs and communities such as 'EduTwitter' to collaborate. Social media is able to provide trainees with access to professional networks, as well as the pedagogical content knowledge needed to support reflection-in-action opportunities.

Teachers as learners

Reflection is important in enabling teachers to critically question their assumptions and deepen their awareness. By being proactive in seeking opportunities to develop, a teacher will remain open to the idea that all teaching is an opportunity to learn. Technology can help here, providing a tool to expand networks and broaden exposure to research developments, placing teachers in the best position to reflect regularly and deeply on their practice.

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CASE STUDY

Professional learning through a daily online survey platform

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Teacher Tapp is a daily online survey platform used by over 5,000 teachers across the UK each day. Through a mobile app on teachers' phones, it sends a notification at 3.30pm each day, and then asks three questions about the working day. These questions may ask about events in the teachers' schools that day, for example, 'Where did you eat your lunch', or about their opinions on some aspect of education, for example, 'To what extent do you agree with the statement, 'I believe my teaching is preparing children for the 21st-century workplace'?'.

After the teachers answer the questions, they can access results from survey questions set the day before, then receive a 'daily tip' consisting of a recommended blog on an aspect related to teaching or professional development.

Teacher Tapp as CPD

Rather than just being an app for data-gathering, being part of the Teacher Tapp community provides a daily chance to partake in 'micro-learning' – a form of drip-feed learning interactions which enable continuous professional development to occur without the employee taking time away from their job (Gassler et al., 2004).

The most obvious way in which the app provides professional learning is through the 'daily tip' with a recommended read, connecting users to timely, relevant content. About a third of users say they are motivated to use the app by the daily read, and we know from teacher feedback that many users bookmark the links to read later. Teachers responsible for curating teacher training within their school, perhaps through a weekly newsletter or delivering after-school training, also say they use the materials to help with creating content.

Breaking down the echo chamber of social media

But Teacher Tapp also enables an innovative approach to professional learning through the survey questions themselves. The majority of teacher users say they sign up to Teacher Tapp

because they are curious about the results. Thinking about their own answers provides an opportunity for reflection on their own practices and perspectives, and seeing the results from all users on the following day opens up communication between the profession as a whole and the individual user. Differences between the user's own practices and perspectives and those of the wider profession are highlighted, encouraging further reflection.

Whilst at present the app does not allow two-way interaction between users in the way typically facilitated by social media – for example, there is no way to message another user – teachers often go on to discuss Teacher Tapp results on social media channels, such as Twitter or Facebook. Here, they may again reflect upon their surprise that so many others answered the questions differently to themselves.

Commonly the difference occurs because teachers, like all humans, have a tendency to believe their own opinions and communities are 'the norm' – known as the 'false consensus effect' (Ross et al., 1977). The life of a secondary maths teacher in an urban setting is, however, very different from the life of a primary teacher in a small, rural school. Teacher Tapp results visibly show teachers the reality of the whole profession and discourage the narrow 'echo chamber' that can occur on social media when teachers only interact with those who are most similar to themselves.

Flexible learning

The flexibility and low time-requirement of the app is one of its strengths – it takes under 45 seconds to answer all questions. Many Teacher Tapp users access the app while moving around their workplace, for example when returning to their car at the end of the day. To promote engagement, there is some gamification on the app, with users receiving digital badges for certain behaviours such as reading 100 tips or the length of their usage.

Taking results further

As well as providing results from each day's survey on the following day, we provide a weekly analysis of the findings which breaks down the results further, enabling users to learn more about different groups. The results have so far informed national reports on teacher recruitment and retention; the way that schools use former pupils as role models; the importance of pupil confidence; and partnerships between universities and secondary schools. We have also informed national debates around teacher workload, and particularly digital workload (e.g. the use of emails).

The future for Teacher Tapp's micro-learning platform

We are already communicating our findings widely, including publishing reports via nationally-recognised organisations and by sharing our results through the national media. In the short-term we are implementing more interactive features within the app, for example allowing teachers to see the aggregated results of teachers 'near them' and who are 'like them' on crucial characteristics.

There is much more for Teacher Tapp to explore in the future, including an evaluation of whether being on the app changes teachers' behaviours, thoughts or feelings over time. We can also imagine a world in which teachers are able to better track their learning journey within Teacher Tapp and are given more appropriate tips based on their question inputs.

Ultimately, Teacher Tapp is already connecting with thousands of teachers each day by using the app for just a few moments. We aim to ensure that everyone on the app learns something new every day. As we grow onwards and upwards, we want to spread this to more teachers, in more countries, in ever more effective ways.

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CASE STUDY

The Chartered College of Teaching's online Early Career Support programme

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Recruitment and retention of our teachers is one of the biggest challenges the teaching profession faces in England, with increasing pupil numbers, fewer teachers joining the profession, and more teachers leaving, especially in the early years of their career (Worth et al., 2018).

Teacher quality is also the biggest in-school factor of pupil attainment (Hanushek and Rivkin, 2012) and teachers' learning curves are at their steepest in the early years of their career (Allen and Sims, 2018).

So if teaching is to be seen as a world-class profession, and if we want to improve outcomes for children and young people, our teachers need increased access to support and development as soon as they enter the classroom and across their careers.

The Early Career Framework

The DfE's commitment to strengthening the provision for early career teachers in England through a two-year induction period recognises the importance of support at this stage of teachers' careers (Department for Education, 2018). This new Early Career Framework (ECF) both increases the entitlement of early career teachers to support and training and specifies content that should be covered during the two-year period. The ECF will be rolled out in three regions from September 2020, and nationally from September 2021.

The ECF sets out a clear expectation for new teachers to engage in CPD. But limited time, capacity and budgets can be barriers to providing high-quality learning, whilst research suggests that a number of traditional CPD approaches, such as one-off training workshops, often fail to deliver timely, context-specific knowledge (Kraft et al., 2018).

At the Chartered College of Teaching, we're interested in how technology might provide a solution. We already have three free CPD courses for teachers available online through FutureLearn, as well as numerous online activities for our members and programme participants. Learning online can make CPD more scalable, accessible, affordable and flexible, and research suggests it can be equally as effective as face-to-face learning (Fishman et al., 2013; Russell et al., 2009), but only when careful consideration has been given to its design and implementation.

Effective online learning

Effective CPD often exposes us to new perspectives that can feel discomforting. Learning online can allow time to return to ideas we find problematic, after having taken time to think. Having time and space for reflection in between learning modules can allow us to engage with research findings and new perspectives in measured ways, in order to more effectively judge whether they hold answers for our particular context. We can also construct and present reading materials and activities in a way that supports comprehension based on what we know from cognitive science, using notions of retrieval practice, spacing and interleaving to design our learning in a way that maximises retention.

A climate of trust between participants is a vital component for effective learning online. When facilitated successfully, participants in an online community can feel encouraged to take risks, discuss successes, failures and challenges (Lantz-Andersson et al., 2018) and experiment in their classroom practice. While these might be important outcomes for any professional development, they are particularly important for early career teachers. Being part of an online community that connects teachers through carefully constructed activities, discussions and debates can build confidence and equip them with the tools they need to challenge practices and processes within their own context.

Learning at a distance can present challenges for motivation and engagement. A key consideration when designing online learning is whether the activities will lead to the kind of deep thinking that sparks changes to practice. If the design includes the best of what is effective in face-to-face development – such as cycles of deliberate practice, instructional coaching, video reflection and engagement with research – and the learning interactions are designed in such a way that enable reflection on phase, subject and school context, then maintaining this motivation seems more likely.

Our pilot project

In order to test one possible model to support early career teachers through the ECF, the Chartered College of Teaching is delivering an Education Endowment Foundation-funded pilot of year-long, fully online training programme centred around an instructional coaching model. In this, a coach works collaboratively with their early career teacher and guides them through cycles of deliberate practice of specific teaching skills. The coach observes the teacher practising those skills, followed by a structured reflective conversation to move the teacher's thinking on and deepen their understanding.

To guide this coaching, early career teachers and their mentors access a range of resources in a structured online course. Live webinars supplement individual study, and participants are allocated to groups for peer activities, feedback and discussion facilitated by a course tutor and completed online. Additionally, a member of the school leadership team is expected to engage with preparatory materials to ensure they are providing a supportive professional learning environment for their early career teachers and mentors.

The course only covers selected areas of the new ECF as it lasts a year rather than the full two years for the ECF. By the end of the course, mentors and early career teachers should be confident in theory and practice around key content from the ECF, providing teachers with the tools to develop their practice, benefiting pupils and supporting the retention of our excellent teachers.

Evaluation

The project will be evaluated by the UCL Institute of Education, with outcomes expected in 2020. It aims to pilot a delivery approach that would be scalable, feasible for schools and which shows promise of having an impact on teachers. The evaluation approach includes surveys at the start, middle and end of the programme, as well as in-depth case study visits to schools, seeking to evaluate the impact on mentors, mentees and schools, and provide feedback on this approach to mentor development. Learning from this pilot will inform headteachers and mentors about ways to support early career teachers.

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Designed and typeset by Alchemy Mill.