National College for Teaching & Leadership

What makes great professional development: research case studies

Teaching schools R&D network national themes project 2012-14

Research Case Study

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Affinity Teaching School Alliance

Alliance name	Affinity TSA
Alliance context	Affinity TSA has a partnership of 68 primary schools from across Leicester City, Leicestershire & Rutland working together to drive school improvement.
Schools involved in the research and development (R&D) project	Six primary schools as part of the TSA.
Research focus	For this two year research project Affinity TSA are running six lesson study projects based around the subject of mathematics. Each school decided on their specific focus area based on personal or school area of need as suggested in claim 4 (Stoll, Harris and Handscomb, 2012).
Research question(s)	Can lesson study be used as a research / continuous professional development (CPD) tool to improve teacher subject knowledge / pedagogy and raise pupil attainment within an area of mathematics?

The implementation phase

In order to determine the focus for the project, views were sought across the alliance. Schools were invited to join the project and a lead teacher was chosen to lead the project across the individual schools. In order to drive this project forward, a specialist leader of education (SLE) was given the task to co-ordinate the schools under the guidance and support of the research and innovation (R&I) working group of headteachers. This central organisation turned out to be critical in driving the project forward as the schools were far apart from each other geographically and it was difficult to meet as a group without the SLE co-ordinating all schools.

The views sought from across the schools indicated that there was a need within schools to ensure that specialist subject knowledge in mathematics needed to be disseminated from specialist teachers to non-specialist teachers. With the increase in opportunities to become specialist primary mathematics teachers (eg masters course, National Centre for Excellent in the Teaching of Mathematics (NCETM) professional development lead), it was important that this specialist knowledge was passed to non-specialist teachers in order to impact on school improvement.

The intended outcomes of the project

A lesson study approach to CPD will:

For teachers

- improve mathematical subject knowledge
- improve skills towards addressing misconceptions and improving attitudes towards mathematics amongst children.

For children

- raise pupils attainment within the focus groups
- improve attitudes towards mathematics within lesson study sessions
- improve use of mathematics vocabulary within sessions
- impact on the progress of a key group of children

For schools

- develop a sustainable approach to CPD that develops subject knowledge amongst less experienced staff and also supports more specialist members of staff in furthering their understanding of how children learn.
- create a more strategic link between lesson study, as an approach to CPD, and school improvement priorities

The innovation phase

What approaches to professional development have you been trialling throughout the project?

Throughout the two-year project all six schools have used lesson study as a pedagogical strategy. All schools initially followed Pete Dudley's *Lesson Study Handbook* (Dudley, 2014) and have carried out 2-3 lesson study cycles over a period of time (different time periods within each school). Most lesson study groups have consisted of 2-4 people.

How did you maintain and build the momentum and collaborative dimension of your work? How did you distribute the leadership of this work?

- After the launch of the project, R&I champions in individual schools led the work in their own schools.
- At alliance level research and enquiry is led by the R&I working group in partnership with the R&I SLE. Leadership is distributed across member schools through a network of R&I champions.
- Each of the six schools has placed lesson study in high regard – it has been embedded within school development plans and individual teachers performance management reviews. This suggests it has had a direct impact on being able to maintain and drive the project because it is never off the 'agenda'.
- Affinity TSA has placed a huge amount of emphasis on lesson study which has included 'research champion network meetings'. Headteachers and some mathematics SLEs have also visited Shanghai and have seen first-hand how lesson study can be used within the alliance.
- Schools meeting together for this project have proved a little more challenging due to busy timetables and the distance between the schools. Where possible we have met face-to-face but mainly we have contacted each other through email or telephone. The senior leadership teams (SLTs) within the six schools have been fully supportive and organised a timetable from the beginning of the year/term to accommodate the lesson study cycles. Many schools have used staff meeting time for research, etc.
- Staff have become more united because they are working to a common goal but the strength of lesson study is that everyone within the groups are learning together (as the research is new). Lesson study has allowed staff time out to have professional conversations about an area of mathematics where previously there was little time for this.

The impact phase

There was a range of impact evidence gathered from the six reports. Summarised below are the different types of data that were collected in each report to give an example of what impact there was in relation to the impact of a lesson study approach.

Teacher's subject knowledge has improved

All reports show that there is an increased understanding of children's understanding in mathematics due to a development of teacher's subject knowledge. The process of going through writing a report for others to learn from shows an improvement in subject knowledge as the participants were able to articulate what they have learnt and how this has been applied in the classroom.

Interviews with staff about the impact lesson study has on their subject knowledge and understanding of how children learn. 100 per cent of reports have cited examples from teachers around the impact of lesson study on their subject knowledge.

Impact of use of resources: photos within the reports show the use of resources and understanding of mathematical concepts using a range of resources. This links to teachers' subject knowledge as it is the teacher knowledge of how to use the resources that impacts on children's understanding.

Teacher's confidence and attitude towards mathematics subject knowledge and pedagogical understanding has improved

The following quotes show the impact of lesson study on the subject knowledge and confidence of teachers:

> It gives us a rare chance to really unpick the most tricky or difficult concepts to teach. The discussion that occurs during the lesson study is invaluable, as sometimes in a daily classroom routine the time for real deep thinking is rare.
>
> The lesson study has been really useful in my own subject knowledge as it has given me the understanding of ways to help children to visualise word problems.
>
> Amongst staff there is a much better pedagogical understanding of the term 'fluency' and how this looks in practice.

These quotes show the impact of lesson study on the pedagogical skills and attitudes of teachers:

> Our research has also highlighted to us that we as teachers, need to model a love of learning by demonstrating the importance of challenges, putting in effort and developing strategies.
>
> The lesson study has really developed some transferable teaching skills which has developed our professional practice across mathematics teaching.

The skills and understanding of the learners has improved

Observations and written work of how children solve problems at the end of the lesson study cycles (100 per cent of schools).

Positive impact on children's levels. There are many factors that influence progress within a classroom and this cannot be fully attributed to the work of the lesson study focus. More evidence and research would need to be carried out.

Observations / assessments to show that misconceptions found during the lesson study cycles have been addressed and there is improved understanding (66 per cent of schools). This is more specific and shows an impact of the lesson study cycles.

The attitudes of learners has improved

Observations / questionnaires show a positive impact on children's attitudes to learning within mathematics. There was a range of different ways in which children's attitudes to learning changed. A key requirement of lesson study is the interviewing of focus pupils after the lesson. 66 per cent of the schools showed an improvement in attitudes to learning through this questioning including a greater readiness to solve mathematics problems, improved enjoyment of mathematics and focus children actively participating more within lessons.

The ethos across the schools has greatly improved in some cases

One school involved in the project outlined impact across the whole school as it helped to support them in developing an understanding of children's problem solving within mathematics: "across the school there is a greater emphasis on the use of rich tasks and how problems are presented to children". The use of lesson study has given an opportunity to challenge the thinking of two teachers involved in the lesson study. Through whole school sharing of the findings, there has been a chance to challenge how learning is presented to children. The use of the lesson study approach has created a pedagogical shift in the school's approach to mathematics.

One other school has cited that the mathematics subject leader is going to use some of the findings from the lesson study report as a whole school initiative next year.

What claims are you making from the project?

As outlined above, lesson study is a very useful form of CPD and from the data collected it would appear that lesson study supports CPD across the school. There is evidence in the data collected that non-specialist teachers have improved their maths subject knowledge. Further research would need to take place to explore if specialist mathematics teachers also improved their subject knowledge.

Some evidence does suggest that all teachers did improve their pedagogical understanding and mathematics subject knowledge but it is not fully clear in the data. Therefore, we can claim that lesson study is useful CPD for non-specialist teachers but it is hard to claim the same for all staff involved. However, it appears that lesson study:

- improves subject knowledge amongst staff which has a positive impact on the attainment of pupils in focused areas
- leads to pedagogical changes within staff and a greater understanding of how children learn
- research needs to be evidence based and focused on a particular pedagogical aspect / misconception / subject knowledge issue that is revealed when collecting baseline data
- research needs time dedicated to it for it to be most successful. The senior leaders in the school need to back it completely and lesson study needs to be a key catalyst for school improvement priorities

A community of research needs to be based on shared aims and outcomes – the use of a lesson study proforma to be completed by teachers involved ensures the key aspects of lesson study are followed and impact is evidenced.

How do your claims relate to the original nine propositions from existing research?

From the original nine claims within the literature review, we are making strong claims to support four of them.

- **Effective professional development challenges thinking as part of changing practice.**

  All of the projects incorporated evidence into their data gathering at the beginning. During the project, schools took evidence from a number of sources and used it to help challenge thinking about the impact this could have on pupil progress and attitudes. This has helped towards challenging subject specific and pedagogical thinking.

- **Effective professional development uses research and enquiry as key roles.**

  All of the projects demonstrated the use of lesson study as an approach towards professional development. The use of the *Handbook for Lesson*

Study (Dudley, 2014) helped schools to follow a clear process and repeat for a number of cycles. This also helped the group of schools to develop a common planning framework for the lesson study cycles. This ensured that each project followed the key principles of school-based enquiry and ensured that evidence was gathered around the impact on the pupil's progress and attitudes towards learning. This was also triangulated with evidence from the teacher during interviews and via observations of learning by the participants. It was reported by participants to be a non-threatening method to develop practice without the pressures of being formally observed.

- **Effective professional development is enhanced by creating professional learning communities within and between schools.**

  The group of schools worked collaboratively to produce an agreed proforma to support the planning of lesson study cycles. This ensured there was a common purpose and when co-ordinating the differing schools there was a common language to support the procedures involved. Also, with the schools being situated at distance from each other, there were difficulties with co-ordinating all schools to meet together and discuss projects.

  This resulted in successes and areas of difficulty not being shared enough amongst the participants which could have moved the project on further. Perhaps other options could be explored (eg use of online conference facilities, agreeing dates in advance).

- **Effective professional development requires leadership to create the necessary conditions.**

  From the beginning of this year, it was made clear that lesson study needed to play a key role within school improvement. It was felt that due to the very nature of this professional development engaging teachers in the development of pedagogical discussions had the potential to impact on pupil outcomes. Without a clear focus from school leaders on lesson study within school improvement, the lesson study research may not have been allocated the resources of time and budget required for it to be successful. It can be used as a driver for school improvement priorities as it can be used to empower staff in developing their own solutions and responses to school improvement priorities.

The senior leaders in the schools were heavily involved in the project (including many mathematics subject leaders). All the schools in the project ensured this was the case and involvement within lesson study was planned into school improvement plans and subject action plans. One school has developed the use of lesson study

as a team teaching approach to support the monitoring of mathematics across the school. This means that teachers are taking part in CPD while the subject leader monitors aspects of the subject without there being the pressure of a more formal observation. One school identified free school meals (FSM) children for their focus group, therefore applying the intervention work to this project. With a focus for lesson study within the school improvement plan, all of the schools who started the project have been engaged fully with the project and produced a report which shows an impact on school improvement within mathematics.

In terms of conditions created by leaders, it was important that lesson study was securely planned into monitoring and school improvement. The sessions for the lesson study were carefully planned in and in many cases, time was given and secured. This was particularly the case in the second year of the project as schools had a much better idea of what was involved. For smaller schools, this is relatively easy to ensure a whole school impact. However, for larger schools, the data from those involved suggests that it is better to start with a small scale study first where leaders can ensure that it is successful. Then the findings from this lesson study cycle can be shared with the rest of the school.

Final conclusions

What have you found out about what great professional development leads to consistently great pedagogy?

Lesson study is an effective CPD opportunity to support the development of subject knowledge of non-specialist mathematics teachers. Collaborative enquiry in lesson study contexts appears to support the co-construction of new knowledge among team members, engagement with research and the development of pedagogical content and specialist subject knowledge – all of which seem to have had an impact on the quality of teaching and learning and teachers' sense of professionalism. There is evidence to suggest that non-specialist teachers benefit from the CPD opportunity but there needs to be further evidence to support the idea that it is an effective CPD opportunity for specialist teachers.

What have you found out about how to engage in collaborative R&D?

The best way to engage others in collaborative R&D is to ensure that there is a clear driver to ensure outcomes are agreed and evidence is collected. In this particular project it was the work of the SLE involved and R&I champions in individual schools that ensured opportunities were given for the lesson study to take place.

All of the research questions for each school were developed from clear baseline assessments and evidence-based stimuli. This would support the non-specialist teachers in developing their evidence-based practice.

What have you learnt about the nature of collaborative enquiry that brings about improvement for pupils?

Where the collaborative enquiry was supported by the SLT and part of school improvement priorities, the impact on CPD was more easily measurable. The time was allocated for the CPD to take place and there was a greater opportunity to support the improvement of the whole school. In larger schools it is more beneficial to start with a small scale lesson study approach that could then be extended wider across the school.

How will you ensure your learning is shared and sustained going forward?

- Our next major step is to get the schools that are confident using lesson study as a method to work together and complete lesson study cycles. This will be addressed on the R&I committee and then cascaded down through our research champions meetings.
- Build lesson study further into the school's CPD programme and budget.
- Include participation in lesson study in teachers' performance management CPD objectives.
- Publish teachers' lesson study reports within schools and across our alliance for all to learn from.

References

Dudley, P. (2013) Lesson Study: Handbook. Online at: http://lessonstudy.co.uk/lesson-study-a-handbook/ last accessed: 28th September 2014

Brooke Weston Teaching School Alliance

Alliance name	Brooke Weston TSA
Alliance context	Situated centrally over a large geographical spread in the east midlands with a partnership population of twelve schools and three universities, Brooke Weston TSA serves a full range of socio-economic contexts.
Schools involved in the R&D project	Casterton Business and Enterprise College (secondary) Brooke Weston Academy (secondary) Bishop Stopford School (secondary)
Research focus	To explore whether lesson study can be adopted as a tool for meeting the CPD needs of teachers and whether it can also be used as a means for shifting the culture of CPD in schools.
Research question(s)	1: To what extent has the culture of CPD across the TSA changed during the course of the project in terms of (a) perceptions and (b) practices? 2: To what extent does the methods used (in lesson study) impact on student outcomes? 3: How has lesson study impacted upon teacher professional development? What can we do to make people more independent about their own CPD?

The implementation phase

Initially the project was opened to interested parties to consult with their schools and departments; to learn what was on their action plans for the up-coming two years (claim 3: *What makes great professional development: nine claims from research* Stoll et al, 2012). Participants were encouraged to, in the true spirit of lesson study choose the area for their enquiry based on a challenge in their teaching that they would like to work through (claim 6). The project itself had a more strategic aim in its desire for schools to examine their CPD practices and cultures. There was cross-over then, with the nine claims because although some decisions were being made from a top-down perspective, many more local ones were tackled at a teacher level (claim 9). The research questions allowed us also to focus heavily on claims 4 and 5.

These claims consider whether effective professional development connects with work based learning and with the nature of lesson study. This allowed our participants to engage in practices that were rich and natural to teachers. Because of the strategic nature of our work, all the lesson study projects aimed to develop a method within our schools that was sustainable.

Schools were recruited into the project based mainly on choice. This meant we attracted research-engaged schools that were keen to see the results in their own settings. Recruitment took place over a number of months where all partner schools were invited to a launch event and a R&D conference. Surveys were taken at these events and delegates who indicated an interest in further school-based enquiry were invited back to a more focussed event led by Pete Dudley, who outlined his rationale and methodology for lesson study (Dudley, 2014).

The intended outcomes for the project were wide. Essentially, we were looking to develop a model of CPD that can be used effectively in our schools that moved from a more static system of training to CPD based upon peer support and work-based learning (claim 4). It was also important that each lesson study had its own aims and intended outcomes and these were devised by the lesson study teams themselves; each project was encouraged to formulate their own research questions which were also based on outcomes in their own teaching.

For the question of CPD culture we took a survey of all staff in participating schools as a form of baseline date. This was conducted in April 2013, repeated in June 2014 and was administered by our partner HEI, the University of Leicester (claim 4). The intention was to see if there were any changes to practices and values over the course of the project and whether any change could be attributed to this project. In addition, individual lesson study triads were encouraged to take baseline data to measure the impact of their own enquiry.

The innovation phase

Pedagogical strategies differed across the projects. Some of the specific practices are detailed below that spanned the breadth of all the lesson study projects. This list is not exhaustive:

- Student centred learning with teacher as facilitator and student as teacher, learning by reinforcement and problem solving strategies.
- Student voice through questionnaires.
- Differentiation, for example, group work and the criteria for successful selection of groups and matching group working to activity.

- Paired / cued spellings and additive word lists to reinforce spellings. This developed peer-to-peer support for students and experimented with selected pairings.

- A combination of innovative teaching styles; use of audio, video, role play, humour, competition and didactic teaching styles; comprehension, exam question and answer, teacher led instruction.

The whole ethos of this lesson study practice reinforces a hegemony that is clearly based on teachers learning from one another. The group of schools took on board Hargreaves's ideas about joint practice development (JPD) as discussed at a National College for Teaching and Leadership (NCTL) conference in November 2011 and again in March 2012. This form of practice allows teachers to take more responsibility for their own professional development using school-based enquiry at its heart (claim 6). The aim was to move away from a structure where CPD is something that is **done** to teachers to something that allows full ownership. Lesson study is a form of CPD that allows teachers to consult with students and learn from their learning. It permits a bit of risk taking in their lessons because observation is no longer built on a judgement but on observation of student learning. It therefore legitimises that risk taking (Dudley, 2014).

The project was designed specifically with the foresight to consider how these methods of CPD could be sustainable in the future. Each participating school was provided with a facilitator, who was usually someone on the SLT, and each lesson study had a self-selected leader, who was usually a younger member of staff, but someone who was excited and had a vision for the project.

All group members were able to choose their focus, but each needed to be, in some way linked to school or departmental action plans. All, therefore, chose an issue that was relevant to them. Each facilitator provided the project co-ordinator (who was also the R&D lead for the TSA) with regular evaluations focused on both practices and outcomes. Each group worked collaboratively with each other and leadership was distributed to teachers who had an investment in the scheme.

The impact phase

Our outcomes were, as far as possible, matched with the original research questions we outlined. As can be expected from lesson study, the outcomes were far ranging and were both qualitative and quantitative in nature. We found both hugely useful, with the culture survey representing a rich form of quantitative data for the SLT in schools involved.

The project's main research questions and our outcomes are detailed below:

1: To what extent has the culture of CPD across the TSA changed during the course of the project. Consider (a) perceptions and (b) practices.

Results from the April 2013 culture survey suggested that teachers and managers in all three schools rated some of the key concepts of lesson study quite low in their list of priorities. Where mean scores in the 40s are low and a mean score of 80+ high, results from the lead school, for example, suggest collaborative practices were relatively low (at 51.41) in April 2013 and showed a slight increase in 2014 at 56.00. Although still moderate, it represents a shift in the right direction. This suggests that, in this school, teachers are now less likely to be satisfied with more traditional forms of passive CPD and would be more amenable to collaborative practice (claim 7). The results for research practices were also similar: scores between 2013 and 2014 increased from 42.75 to 48.33 in the lead school.

The two key concepts for lesson study were not being used well in our schools; the outcome of the two-year project suggests there has been some impact on whole school thinking, for example, how teachers valued collaboration rose from a moderate mean of 67.93 to a reasonably high 72.95 in the lead school and in one other school from 70.67, already relatively high, to 75.23 (although there was a decrease in practices and values for collaboration in one school, which will need investigating in the future).

Discussion notes and interviews with facilitators also formed an important part of the outcome data, especially regarding teacher perceptions. All teachers involved in lesson study, without exception, reported that they have learnt a lot from peers in this non-threatening environment. Facilitators, in evaluation, were able to confirm that this method of CPD is one that is time consuming but sustainable. The methodology of this form of school-based enquiry has been developing through the two years of the project and has affected the way people view CPD (see results above). The change in the culture is something that has to come, to a certain extent from top down (claim 9) and is a relatively slow form of change. That said, one school has developed a clear second generation lesson study in which the participants of the first are now facilitators with new groups.

It is also clear then that practices are changing. Just taking some simple numerical data can show this. Two years ago there were no lesson study projects happening in any of the schools. We began the project with two projects in the lead school and one in each of the other school. By the end we had two new lesson study projects in the lead school, three more in school 2 and two more in school 3.

At this point it becomes quite difficult to count because current lesson study leaders are now working unofficially with other groups. In addition, the TSA is demonstrating the sustainability of the project through introducing this and similar methods of

school-based enquiry to our colleagues who are new to the profession (claim 6). The lead school has introduced this as a unit of the newly qualified teacher (NQT) programme and with initial teacher training (ITT) colleagues.

Evidence of a movement towards JPD methods rather than more traditional forms of CPD can ironically be seen in the participation of schools in the TSA who did not sign up for the lesson study project. We have a local primary school and teachers from three projects in the lead school were able to go in and observe literacy and numeracy strategies with key stage (KS)1 and two children.

These practices were then used within the planning for the lesson study cycles. This form of school-to-school collaboration is becoming much more widely used with schools acknowledging the benefits of working with alliance partners (claim 8).

As suggested, both by Hargreaves at the NCTL conference (2011) and claim 1 (Stoll et al, 2012), our project clearly set out with the end in sight and with opportunities for knowledge sharing built in from the inception. At the outset, the TSA formed a larger alliance with two other local TSAs, to form an east midlands lesson study group. We have now organised two conferences attended by schools from all across the midlands, using presenters with an inspiring collection of experience from their own lesson study projects. The feedback from both conferences was hugely positive, for example in 2013, one delegate stated it was “most useful hearing about how lesson study is being developed and interpreted in other schools”. Another stated, “I knew a little about the theory of lesson study when I arrived this morning, but I leave feeling quite enthused to ‘give it a go’. Indeed, responses from this first [2013] event show that 96 per cent of participants rated the quality of the conference as ‘good’ or ‘very good’. The feedback from the second event is still being analysed but early indications show that responses are just as positive. This cross-alliance group also collaborated with the culture survey and were part of the same action learning set meetings run by the national research partner.

As an outcome to the project, these alliances between TSAs and the universities have been highly profitable and positive. University colleagues were able to add their own expertise in managing and developing research projects and point the lesson study groups to effective project design. The University of Leicester held a central and strategic role in the project, for example: being part of the drafting group for our ethics policy, which has now been disseminated to other TSAs; designing the initial culture survey, which provided robust data to measure impact and meeting with teams for project support. In turn, the university gained experience of working with a group of schools, getting involved in school-based enquiry at a ‘shop floor’ level.

The TSA and university have also engaged in shared writing published in *Professional Development Today* on ethics and we have presented to UCET

(Universities Council for the Education of Teachers) together. This collaboration between universities and other TSAs has led to the planning of an annual east midlands lesson study conference. Hearing stories from other east midlands' schools has been important, as has the chance to structure our work around the opportunities for knowledge sharing. The University of Leicester has put us in touch with key academics and academic writing which have been essential for planning and ensured our projects were informed by academic study.

This development of highly effective professional learning communities has been crucial to the success of the project (claim 8). Indeed, the only other TSA from our action learning set groups with the NCTL was another in the west midlands region who was invited to present at the 2014 conference so furthering the midlands partnerships. This TSA is likely to be involved in future cross-alliance partnerships.

2: To what extent do the methods used (in lesson study) impact on student outcomes?

We tried to collect evidence for this question based on:

- pupil voice
- peer learning of teachers
- student responses through observational notes and video data

Though largely qualitative in nature, a number of lesson study groups sought to access student outcomes through data driven evidence, either based on student testing or departmental / school data. There was clear evidence to suggest that students responded well to interventions and strategies used as part of the lesson study cycles. Groups found the video data essential to their planning and development, viewing it for planning and reviewing the information at a later date when they wanted to consider the CPD journey they had taken. Teachers have also used this for evidence of pupil voice.

In many of the studies, teachers devised tests or quizzes before and after the research lesson took place. This form of quantitative data proved invaluable for evaluating outcomes, although 100 per cent of staff involved also agreed that the more varied qualitative responses were also essential for adding context to the figures and providing a rich learning tool for teachers (claim 5). Nearly all the projects gathered qualitative data in the form of questionnaires for students asking their level of confidence in the subject before and after the lesson. In all these cases, improvements were recorded.

In the music / numeracy project, the student responses were overwhelmingly positive:

- After the first lesson study cycle, with a fair proportion of the year 7s (approximately 30 per cent) stating they disliked numeracy at primary school prior to the lesson.

- Following the lesson they mostly (90 per cent) stated they thought the numeracy strategies were useful to furthering musical knowledge.

- In addition, student work in the form of a plenary test showed students had acquired the necessary skills for that lesson and 83 per cent of students observed said that the numeracy elements helped them to understand how to read notation.

Another project has used spelling test data as well as teacher questionnaires both before and after the event. This project was also working with some students from another project (Closing the gap: test & learn) so individual reports and class data was used to inform planning of the starter programme. The project also adapted one of the phonics interventions from this project to their own needs.

- After the two cycles 71 per cent of the students found the spelling strategies useful.

- At the beginning of the project, 57 per cent of students surveyed thought spelling was little or no use to them in science however, after the cycles, 67 per cent of the students found the methods enjoyable. This suggests a marked shift to raising the profile, for the students, of literacy strategies in science lessons.

- Students' spelling accuracy increased, with 68 per cent of correct spellings in the first cycle increasing to 75 per cent in the second.

Unanimously, teachers involved in all these projects agreed that they learnt a huge amount from the process but it was agreed that this was because it was based on student outcomes and progress. This suggests that there is a direct link between CPD and pedagogy.

Where results were less expected or less positive, the researchers made this a priority for their subsequent lesson study cycle (claim 6), for example, one project responding to student interviews after the lesson was able to include more student centred approaches in subsequent lessons and received a 95 per cent favourable response after that second research lesson with evidence from student work also suggesting the change of pedagogy having an impact on student learning.

3: How has lesson study impacted upon teacher professional development? What can we do to make people more independent about their own CPD?

Evidence from the culture survey from all schools involved would suggest that whilst changes in perceptions and practices towards a more independent form of CPD are relatively slow, there is a rising trajectory where colleagues are more aware of the variety of CPD options available. In addition, performance management data also suggests that teachers at all levels are being encouraged to adopt a more proactive approach to their own professional development. Sadly, the duration of the two year project is perhaps too short to see the real impact and the results of the project suggest that culture change is often something that is incremental and takes time.

Additionally, the culture survey demonstrates that teachers in the three schools are often not aware of the clear link between research, for example, and CPD. The R&D working group of the TSA grappled with the definition of the term 'research' which seems to be misleading for many. Colleagues are struggling to see research as anything more than book research carried out by people completing Masters courses, when, in fact, all teachers are researchers, which is why, for the purpose of this study, we tended to use the term enquiry, which was more teacher friendly. More, however, needs to be done to dispel these myths. These concepts of CPD are becoming more sustainable across the alliance.

Our NQTs and ITTs currently have two sessions in their programme given to school-based enquiry, where the model of lesson study is disseminated. Perhaps this is where there were the most significant results from the culture survey. In the lead school, which has now started hosting the NQT and ITT programmes, it recorded in 2013 a mean value for teachers with less than two years of experience of 22.22 for research orientation practices and 36.11 for values. These were incredibly low, but potentially due to the issue of not really understanding how research can be used in the classroom.

In 2014, following one year of the NQT programme where lesson study was advocated strongly, these figures had increased to 61.11 and 63.89 respectively.

Concluding thoughts

It is clear, through this project, that there is a direct link between collaboration, JPD, improving pedagogy and enhanced student outcomes. Lesson study is proven to really put the magnifying glass on issues and, as Dudley stated in our September 2014 conference, the processes allow us to slow time down, to really consider how our students learn, by observing and consulting them. He states, "we must develop superpowers [of lesson study]… the x-ray spectacles that allow us to see the invisible" (Dudley, 2014, east midlands lesson study conference).

The way we have gone about this study was to allow teachers the autonomy to develop their own interests resulting from their own experiences. Dudley also states that this is the way lesson study will go viral. It is a process that "energises and mobilises" and as a result can become a "game changer" (claim 2).

Finally, the biggest barrier to success for this project has been time. This is perhaps a reason why the results from slightly more experienced teachers are less promising in the culture survey. In the lead school, the mean for collaborative orientation practices was 45.00 in 2013 for teachers with 2-5 years' experience reducing to 38.33 in 2014; however the values score for 2014 was 80.00 showing there is a huge discrepancy between what teachers believe is right and what they are actually doing. 100 per cent of the teachers involved in this project agreed that time was a barrier. Perhaps the best advice comes again from Dudley (2014) who tells us that where it works well in Japanese models the process is marked into the timetable, although it could be argued that, in this country, that provision needs to come from central Government. In the recent lesson study conference, Dudley cited Sue Teague who stated, "heads need to do it to lead it" implying that some decisions clearly need to come from top down (claim 9), even if leadership thereafter is distributed to teachers.

References

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Cambridge Teaching Schools Network

Alliance name	Cambridge Teaching Schools Network
Alliance context	Cambridge Teaching School Network comprises three TSAs located close to Cambridge: Cambridge All Through TSA, Cambridge Area TSA, and The Saffron Alliance.
Schools involved in the R&D project	The project was coordinated by Saffron Walden County High School, the lead teaching school for R&D within the Cambridge Teaching Schools Network, which comprises 30 partner schools (primary and secondary).
Research focus:	Researching how professional development in the form of cross-curricular cross-phase triads impacts on classroom practice and the quality of pupils' extended writing.
Research questions	When cross-phase and cross-curricular teachers work together in a triad with a focus on the delivery of extended writing, what changes take place in classroom practice as a result and how does this impact on individuals' professional learning, students' attitudes towards extended writing and the quality of their extended writing?

The implementation phase

To establish our research enquiry, the network's R&D steering group discussed common areas for development and CPD strategies that we have already used within our schools to address these. The result of this was an agreement that we would research the following questions:

1. When cross-phase and cross-curricular teachers work together in a triad with a focus on the delivery of extended writing tasks, **what changes take place in classroom practice** as a result?

2. When cross-phase and cross-curricular teachers work together in a triad with a focus of extended writing tasks, how does this **impact on an individual's professional learning**?

3. What is the impact of these changes on **student attitudes** to extended writing?

4. What is the impact of these changes on the **quality of extended writing** that is produced?

We believed that this would allow us to investigate elements of each of the 9 claims.

How did you go about establishing your partner schools?

Relationships between the schools within Cambridge Teaching Schools Network have been well established over a period of time. Saffron Walden County High School is the lead school on R&D as it has a history of high quality approaches to research. As well as the schools within the Saffron Alliance (including Hedingham School, Notley High School and Alec Hunter Academy), the following schools are all active research members within this group: Comberton Village College, Histon and Impington Junior School, Nene Park Academy and Parkside Federation.

What were the intended outcomes of the project?

For staff

- to have opportunities to observe and have collaborative discussions with teachers working in different contexts
- to improve their awareness and understanding of approaches taken in different departments and at different phases towards the teaching of extended writing
- to improve their practice in terms of the teaching of extended writing as a consequence of this improved understanding

For pupils

- as a result of teachers sharing successful approaches, students to be taught extended writing in ways that are seen to result in writing of a higher quality
- as a result of greater collaboration between departments and between phases, students to benefit from a more ‘joined-up’ approach towards the teaching of extended writing
- as a result of this more ’joined-up’ approach, students to be more consistently reminded of effective strategies to deploy when undertaking extended writing

What evidence did you gather at the baseline stage and what did this tell you?

We used:

- the ‘nine claim gap analysis’ followed by staff interviews to gain an insight into teacher attitudes to CPD
- a teacher reflection sheet to consider teacher perceptions about student writing
- a student questionnaire to assess student attitudes to writing
- work samples to assess student baselines

A summary of the baseline data was completed by each of the schools involved.

Some responses were expected, particularly in terms of teacher perceptions about **student writing**. It was agreed that the standard of writing can dip in subjects outside English in year 7 (in humanities subjects, for example) and that presentation and grammatical accuracy appears to be stronger at primary school. These perceptions were tested by comparing samples of work from year 6 and 7 for a group of students and found to be correct in the majority of cases. The ‘student attitudes to writing responses’ showed generally that there is a lack of confidence in approaching written tasks and this can be demotivating. However, all students in the sample gave responses which showed that being able to write well was important.

Other findings included:

- the writing stimulus is important as, if it motivates the students, they will be more enthusiastic and find writing easier
- modelling helps as does working in a guided reading group with the teacher
- verbal feedback helps but not as much as written feedback
- students believed that working hard at their writing is more important in English than in other subject areas

The final point gave the group of schools a new awareness about how students may vary in their approach to writing in different subject areas and therefore provided us with strong evidence for the need to raise our expectations of student writing across the curriculum.

The baseline data regarding **effective CPD** showed that staff felt working in **smaller groups** had a greater impact on professional learning than whole staff events.

Staff also commented upon the importance of having **time to embed new learning in their classroom practice**. Relevance and choice were also other factors that staff felt important regarding CPD.

Teachers had not tried cross-phase collaboration and most teachers had not examined examples of students' work from different departments or phases. We therefore wanted to provide opportunities for these activities to take place.

The innovation phase

What pedagogical strategies have you been trialling throughout the project?

- use of **literacy checklists** and sentence starters
- breaking down the task and providing **strict time limits** for each section, including more time for writing tasks in year 7
- **cross-phase team-teaching** (year 6 and 7 teacher delivering a lesson together)
- providing **examples of students' best year 6 work** in their year 7 books
- **reminding year 7 students of the writing practices** they used in primary literacy lessons
- **introducing KS3 analytical writing strategies** (eg point-example-explain) in year 6

What approaches to professional development have you been trialling?

- setting up **cross-phase cross-curricular triads** made up of two secondary colleagues (usually from English and humanities subjects) and a year 5 or 6 teacher.
- cross-phase and cross-curricular **peer observations**
- cross-phase and cross-curricular **structured discussions**

How did you maintain and build the momentum and collaborative dimension of your work?

- we carefully considered **which staff to involve** and how to group them in triads
- we provided **a focus** for collaborative work (extended writing)
- we provided **clear timelines** (eg how frequently groups should meet)
- we provided **agendas** to structure each discussion

- we provided **time for teachers** (eg meetings during directed time and cover provided to allow observations)

How did you distribute the leadership of this work?

The project was championed by **R&D lead teachers in different schools across the alliances**. These R&D lead teachers maintained contact with the main R&D lead throughout the project. Termly R&D steering group meetings allowed progress and strategies to be shared across the alliances.

The impact phase

What claims are you making about the impact of your work on:

Staff knowledge, attitudes, skills and practice:

It has become clear from the notes taken during the triad meetings, observations carried out and the conference discussions that:

- teachers have valued the opportunities to observe, and have collaborative discussions with, teachers working in different contexts
- teachers have **improved their awareness and understanding** of approaches taken in different departments and at different phases towards the teaching of extended writing
- working as part of a cross-phase, cross-curricular triad has encouraged teachers **to set more consistently high expectations** for students' writing
- teachers have, as a consequence**, improved their practice** in terms of the teaching of extended writing (as evidenced by the improvement in students' work and by the comments made by students – see below)
- **new ideas** have been generated and implemented

Learner knowledge, attitudes, skills and behaviours

In summary, using the student work samples and peer observation notes as evidence, as well as student questionnaire responses, we are confident in being able to state that:

- Pupils have found the **writing frames and sentence starters useful**. For example, increasing numbers of students in a year 7 English class were able to achieve level 7 in their assessments once writing frames were introduced.

- Pupils produced higher quality writing when the **task had been broken down into sections and when strict time limits had been provided for each section**. For example, a student in a year 7 geography class made two whole levels of progress during the year when this strategy was adopted.

- Year 7 pupils felt a greater responsibility to achieve their best level of writing once they saw **year 6 and year 7 teachers team-teaching** together in the classroom. Students reported that they were ‘surprised that the two teachers knew each other’. Another example of a year 7 student comment (which was echoed by others) was: “I worked harder on my writing because my year 6 teacher knows what I’m capable of achieving”.

- Year 7 pupils produced a higher quality of written work when they were reminded **to pay attention to their best year 6 work in their year 7 books**. This was evident during observations of a year 7 history lesson and a year 7 English lesson.

- Pupils in year 7 responded positively when **reminded of the writing practices they had used in primary literacy lessons**. This was a comment that was made frequently in the questionnaire responses.

- Year 6 pupils valued the introduction of KS3 analytical techniques (e.g. point-example-explanation): students commented: "I really enjoyed learning a secondary school skill" and "now I know what to expect next year, I feel a lot more confident".

Your school and other schools

The research conferences held each year were beneficial in building momentum whilst also providing a wider collaborative dimension for our work. The events, which were attended by teachers from across the network of teaching schools, included formal presentations by triad groups from each TSA to explain their research and round table discussions where staff were able to talk to members of other triads about their research. The event was very successful in providing an opportunity for colleagues to learn from each other. Staff talked about strategies that other colleagues had used successfully and were able to consider how this might work in their own schools.

How do your claims relate to the original nine propositions from existing research?

1. **The end in mind:** it was indeed useful to use the baseline data to identify what pupils’ attitudes to writing were so that collaborative responses could be developed.

2. **Challenging thinking:** by working cross-phase and by having access to work from students at another phase, teachers were able to change their opinions of what students are capable of achieving.

3. **Related to need:** the pupil surveys ensured that the collaborative work was centred on trying to find solutions to issues that the students had identified.

4. **Link to classroom practice:** the structured discussions followed classroom observations, allowing the discussion of best practice to be rooted in classroom practice.

5. **Sustainability:** the triads maintained their relationship throughout the year (rather than a one-off meeting), which allowed them to reflect on their development and to discuss the impact of strategies trialled.

6. **Action research as a tool:** members of the triad at times referred to existing research, but this was limited; teachers tended to refer to their own context and their own experiences.

7. **The value of collaborative working:** as outlined above, this was seen to be the most effective element.

8. **Professional learning communities:** as with collaboration, this was seen as being one of the most effective elements.

9. **Necessity of leadership:** it was found that providing time and structures to facilitate the collaboration and networking was crucial to its success.

Final conclusions

What have you found out about what great professional development leads to consistently great pedagogy?

The most productive collaborative discussions take place following peer lesson observations so that colleagues can discuss **why** different approaches were used.

It is very useful to **share examples of students' work** with different departments and phases so that teachers can change their opinions of what students are capable of achieving.

What have you found out about how to engage in collaborative R&D?

Leadership is crucial: it is important to provide a **focus and structure** (eg timelines, agendas, deadlines, common questionnaires etc.) for the collaborative work and to **distribute responsibility** to R&D facilitators within different schools.

What have you learnt about the nature of collaborative enquiry that brings about improvement for pupils?

Collaborative learning is the most powerful form of CPD: bringing together small groups of staff to work together on a **common theme** (in our case, writing) over a period of time (in our case, a year).

How will your ensure your learning is shared and sustained going forward?

Two R&D conferences were held which provided opportunities for participants from different schools to share their experiences and findings. Although the formal part of the project has finished, this model of cross-phase and cross-curricular collaborative working will continue in a number of schools and the R&D conference will become an annual event. We are also now launching a twice-yearly R&D newsletter that will disseminate collaborative R&D work across the network.

Collaborative Schools Ltd

Alliance name	Collaborative Schools Ltd Lead school: The Mead Teaching School
Alliance context	Collaborative Schools Ltd is a strong partnership of 21 schools in the Trowbridge area of Wiltshire made up of three secondary, one special and 17 primaries. Trowbridge is an area of deprivation, representing five of the local super output areas out of the 10 most deprived in Wiltshire.
Schools involved in the R&D project	The Mead Community Primary School. Castle Mead Primary School, John O'Gaunt School, Clarendon Academy, North Bradley Primary School.
Research focus	The potential pivotal role of SLEs in shaping and refining the character of professional development through teacher research, towards a sustainable model of consistent great pedagogy. It was informed by an audit of teacher perceptions of professional learning revealing that a model of one-off training days, isolated from school improvement priorities, was often felt to be ineffectual.
Research question(s)	What is the role of the professional development partner (SLE and aspirant SLE) in effecting change through research engagement?

Context

The Mead Teaching School works in partnership with its alliance of 21 schools in Trowbridge Wiltshire, comprising 18 primary, 2 secondary and 1 special school. The alliance, Collaborative Schools Ltd (CSL), has an established infrastructure for information sharing to meet its collective aims: building sustainable capacity to raise attainment and aspiration; reducing barriers to learning and closing the gap.

Building on the infrastructure of an extended schools model, our alliance has established a cross-phase, alliance-wide data / information sharing protocol, enabling a collective analysis of pupil performance data, Ofsted findings and consultation feedback from headteachers.

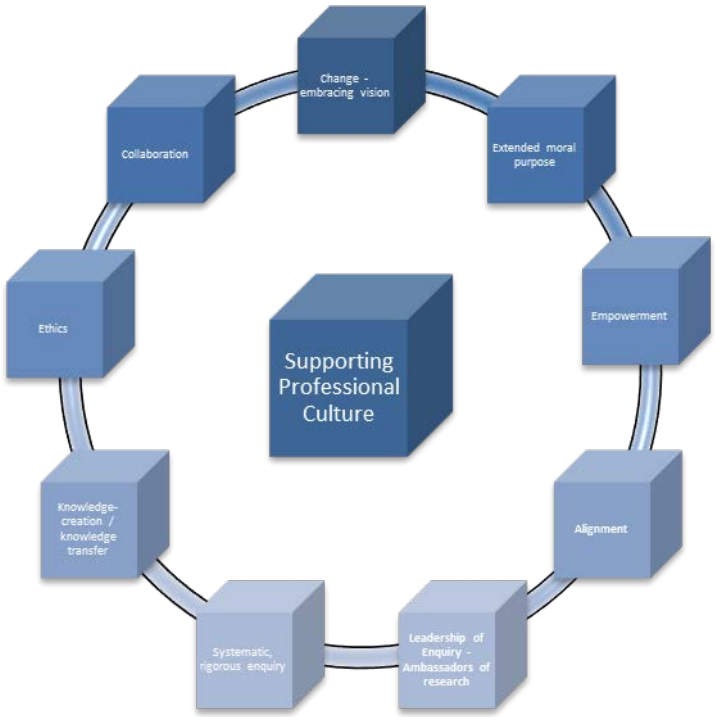
Analysis of this data informs the planning and provision of school-to-school support and priorities for professional learning and R&D.

Background

Building on our existing commitment to research and evidence-based practice, we naturally found ourselves reflecting on the place of R&D within the ‘big 6’ agenda. We recognised the potential of research as a key driver and enabler for all aspects of the teaching school’s work. For example, merging CPD with R&D was a natural step for us to promote rich, evidence-based professional learning.

This helped us to establish a research culture, supporting leaders and teachers in understanding the principles of research-engagement and connecting research with everyday practice, rather than viewing it as an ‘add on’. Importantly, we spent time considering the values and principles underpinning our work towards a research culture as reflected in the diagram below

Figure 1: Values and principles underpinning a research culture



Embedding practice

The introduction of systems and structures are proving critical in embedding a research culture. It has been necessary to create new roles, processes and systems to provide capacity for research activity. The allocation of time and the creation of tangible structures have been critical in securing leaders’ and teachers commitment

and in developing understanding of how research 'fits', and indeed underpins, school improvement.

The following three developments have been pivotal in enabling us to build capacity and embed research within everyday practice:

1. Establishing research hubs.
2. Developing the role of SLEs as research mentors to enable the leadership of enquiry and facilitation of research groups.
3. Introduction of a digital 'research wheel', enabling the integration of research with teacher appraisal and performance management systems.

A summary of our work is provided, but the concept and implementation of the digital research wheel will be explored more fully below.

Research hubs

Research-based 'learning sets' within the teaching school and cross-phase 'learning communities' across the alliance provide opportunities for teachers and teaching assistants to work collaboratively on JPD. These research hubs provide a forum for the exploration and documentation of evidence-based approaches. Purposeful, relevant case studies ensure the transfer of practice within and beyond the alliance. A programme of regular staff meetings and inset sessions are allocated to support this activity within the school. Input has focused on enquiry processes and the impact of research on teaching and learning. The shaping and refinement of our 'spiral'[1] research methodology ensures a systematic, rigorous approach to research, providing a common language for the dissemination of practice.

The high degree of professional dialogue and deep reflection arising from our research hubs is exciting. This has created a strong sense of empowerment in which staff regard research-engagement as core to practice development and professional learning.

> A change in teacher attitudes and behaviours is tangible. I sense increased teacher curiosity, risk-taking and self-questioning. There is a real buzz of activity.
>
> Head of teaching school

[1] **Discovery** - Exploration and Definition, **Research** - Refinement and Inquiry, **Effect** - Validity and Impact, **Growth** - Cultivating Quality and Innovation www.spiralassociates.co.uk

Building capacity

Research hubs are facilitated by SLEs who model the behaviours and attributes of teacher researchers. Staff are supported in navigating research evidence and developing knowledge, skills and understanding of research methodology. Induction and on-going coaching support for the SLEs as research mentors is critical in building capacity for research across the alliance.

Key findings from our research indicate that:

- SLE leadership of research is growing a critical mass of knowledge and experience across the alliance, changing teacher perceptions of what effective professional development looks like and the nature and character of school improvement. This is establishing a strong, distributed model of system leadership in relation to research engagement.

- SLEs are empowered, equipped and excited to facilitate research groups, modelling research engagement themselves and demonstrating a growing knowledge and understanding of research methodology and its application to managing school improvement priorities.

- a change in teacher attitudes and behaviour is tangible with teachers demonstrating professional curiosity, risk-taking and self-questioning. Improved confidence in the articulation and description of their own practice has also been a notable feature, alongside a sense of pride and enjoyment in sharing their research journey and findings.

Digital research wheel

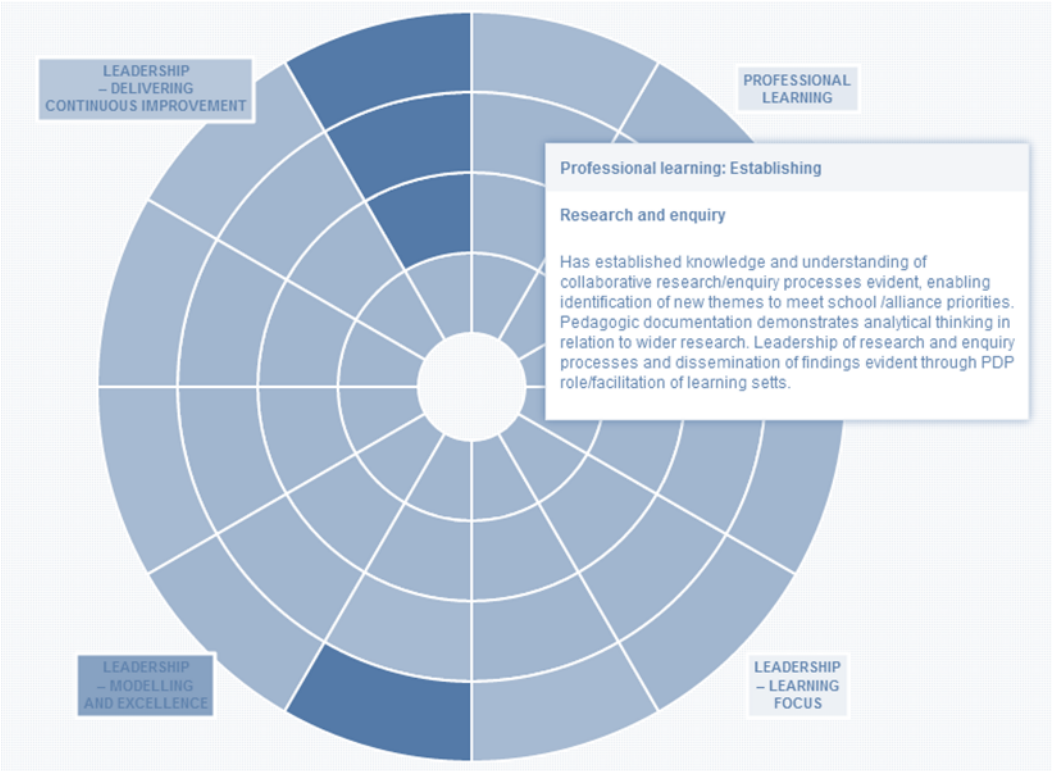
The integration of teacher research with appraisal and performance management both recognises and values the growing competency of teachers as researchers. The introduction of an innovative digital research wheel capturing this growing competency is providing exemplars of practice and enhancing understanding of the leadership of enquiry / teacher research.

What is the research wheel?

The research wheel is a digital self-assessment tool designed to support leaders, teachers and teaching assistants in navigating their own research journey towards maturity. Competences, including knowledge, skills and behaviours, recognise the key steps on this journey. These competences are presented on a continuum from emerging - developing - establishing - leading, as illustrated by the concentric circles of the wheel.

As shown below, research competences are captured under a segment of our broader ‘leadership and learning wheel’, under the heading of ‘professional learning’. This strongly supports teachers in recognising R&D as a key vehicle for their own learning and school improvement. The example highlighted in figure 2 provides a description of what an ‘establishing’ competency may look like in practice, referencing expected knowledge and skills in relation to collaborative research, pedagogic documentation and leadership/facilitation of research activity.

Figure 2: Research wheel



How is the research wheel used?

The research wheel is owned by teachers and supports them in considering and articulating how their practice demonstrates research competences. Critically, the digital nature of the tool enables teachers to upload evidence of their work to demonstrate impact on children’s learning. Examples include case studies, film footage of interviews and pupil focus group discussion, photographic evidence and graphical representation of impact.

The research wheel is shared with line managers during teacher appraisal meetings. Research evidence is viewed and line managers support teachers in moderating judgements related to their research activity and in identifying training needs. The maturity model basis of the wheel supports target setting, providing teachers with clear next steps for improvement. A further function of the digital tool allows line

managers to upload relevant documents, thinkpieces and resources to scaffold this next stage of development.

This whole process recognises research as a valued and integral part of performance management and provides a powerful mechanism for line managers to communicate the pivotal role of research in developing professionalism and leadership capacity.

Capacity-building and dissemination

The wheel is supporting capacity-building, enabling teachers to define where they currently are, and aspire to be, on their research journey. The developing skills, confidence and enjoyment of research is tangible across the school / alliance.

Recently the research wheel has been introduced to teaching assistants and trainee teachers as part of their appraisal / assessment and this is further developing our capacity for research activity. Supported through a structured programme of induction and coaching, our SLEs are expected to demonstrate the ‘leading’ competences for research and this sets an important standard across the school / alliance.

Uploaded exemplars of research activity can be easily disseminated to demonstrate what good practice looks like at each stage of the maturity model. This has the potential to highlight the impact of research and to facilitate knowledge transfer. As we further co-construct and refine the content and application of the research wheel with our school leaders and teachers, dissemination remains a key focus of our work.

Devon Teaching School Partnership

Alliance name	Devon Teaching School Partnership
Alliance context	43 primary and special schools Broad range of academies, maintained, federated, cooperative trust. Wide range of large urban, suburban, town and small village primaries with IDACI (income deprivation affecting children index) from 8 per cent to 89 per cent deprivation.
Schools involved in the R&D project	Elburton Primary Academy Honiton Primary School Great Torrington Bluecoat Primary School Bishops Tawton Primary School Thornbury Primary School Lipson Vale Primary School Goosewell Primary School Ilfracombe Infants School Pinhoe Primary School Appledore Primary School Withycombe Raleigh Primary School Alphington Primary School
Research focus	Meeting the computer science skills gap in primary schools.
Research question(s)	What is the most effective CPD to prepare teachers with the subject knowledge and pedagogical tools for outstanding teaching and learning in computing science?

The implementation phase

Headteachers from the 43 schools discussed and addressed the implementation challenges facing Devon primary schools brought about by changes in the new national curriculum. Computer science was considered to be the most challenging as many of its processes and concepts would be new for staff and therefore building confidence over time necessary for it to be successful.

As it was a new ‘pioneer’ subject there was not a known way of conducting this type of CPD and therefore very suitable to research under all of the nine propositions and in particular:

- claim 2: challenging thinking / changing practice
- claim 3: assessment of individual and school needs
- claim 4: connecting work-based learning with external expertise claim 7: joint practice and collaborative learning
- claim 8: professional learning communities between schools
- claim 9: leadership to create the necessary conditions for learning

However, although claim 5 advocates sustained and intensive CPD we felt that ‘dynamic’ CPD goes beyond this and is perhaps a 10th claim.

How did you go about establishing your partner schools?

An open invitation to heads of the 43 schools to join their information and communications technology (ICT) co-ordinator to the project. A broad range of schools that reflected our locality applied. The only precondition to their joining was that their co-ordinator must be given the opportunity to train staff in 2013-14.

What were the intended outcomes of the project (for staff and pupils)?

Overall: To effectively train co-ordinators and staff to be enabled to teach the new computer science curriculum.

Staff: Co-ordinators: greater confidence and ability to train their staff in computer science using developed materials.

Teaching staff: greater confidence and ability to teach high quality computer science.

Pupils: to demonstrate at least good progress in their learning of computer science in the second phase of the project).

Baseline data was collected from

1. Computer science co-ordinators and subsequently from teaching staff:

    - subject knowledge audit
    - understanding of key concepts
    - understanding of pedagogical approaches
    - confidence in teaching computer science
    - knowledge and understanding of different ways of training staff
    - confidence in training other staff

Our baseline data informed us that across all of these areas knowledge, confidence, understanding of computer science and ability to train even amongst experienced ICT co-ordinators was very low for this new national curriculum subject. The average was a 36 per cent rating. When teaching staff were asked this same baseline question half way through the project it was even lower at 21 per cent.

This data was shared with the group and provided motivation and an imperative to improve.

2. Experience of three key aspects of ‘dynamic’ CPD

    - sequenced training
    - training with gap tasks
    - dynamic CPD where their needs were requested at the end of each learning event and they helped to plan the next session

Whilst a few (21 per cent) had experienced sequenced training and have had gap tasks attached to these, none had been asked for their input into the next training event in a sequence. As a group we felt trialling this approach to be important as with a new subject we had to adapt to the needs of the participants in order to ensure it met their needs and where possible we could differentiate the training.

The innovation phase

What pedagogical strategies have you been trialling throughout the project?

Having been provided with funding in an area where there were no established pedagogical approaches for primary, we decided on two approaches that were felt to be of initial value:

1. **Design brief & process** – similarities were evident with strategies from design technology such that children (and teachers) were given a design brief for their computer programme. Motivation, clear context and purpose for learning were consistently cited as helpful strategies to use.

2. **Exploratory learning** – once a brief was given teachers and children were allowed to 'play' with the programme to see if they could develop their own solutions. When ways forward were found these were shared within the design group with experts teaching others. This assisted not only with the design process but also key elements of computer science linked to logical thinking around algorithms and creative problem solving.

What approaches to professional development have you been trialling?

1. **Sequenced learning –** a gradual build of understanding and skills over time rather than 'one off' CPD events.

2. **Learning with quality, agreed gap tasks** – to embed, consolidate and assist in the review of learning at the next CPD session.

3. **Dynamic CPD**

    - training based on audited need

    - sequenced learning events that are not static but change according to identified further needs

    - learning events are linked by gap tasks discussed, suggested and agreed by participants so that they own and understand them

At the end of a learning event the next session is discussed by participants and they are involved in planning how they want it developed.

How did you maintain and build the momentum and collaborative dimension of your work?

- sequenced CPD provided regular focusing of group

- clearly agreed gap tasks provided intervening focus which had to be completed as these were reviewed by group at the start of the next session
- agreed outcomes from each session e-mailed to all participants and schools providing encouragement and awareness of project
- website for forums and exchange of materials and resources set up

How did you distribute the leadership of this work?

- Initial expertise provided by south west regional director of master teachers in computing from a secondary background. Once the group was established, two primary masters teachers from that group were appointed in the role of 'experts'.
- Master teachers led different aspects of the work directly with participants about effective CPD.
- Research programme lead took responsibility for audit trails, data analysis and evaluation.
- Each co-ordinator was responsible for their personal development of CPD in their school and the production of relevant data sets.

Prospective new leaders were identified and shadowed the second cohort of computer science co-ordinator training. They have now been appointed as SLEs to widen the leadership base across the alliance and provided security of succession planning.

The impact phase

What claims are you making about the impact of your work on:

Staff knowledge, attitudes, skills and practice

There are three aspects to measuring this impact.

1. First, during the initial research phase into what might be effective CPD we assessed before and after the project a range of seven key indicators relating to the computer science co-ordinators' ability and confidence.
2. Second, following the initial research phase we assessed the impact of the computer science co-ordinators training on class teachers, thereby checking if this method of training could be effective back in the school environment.

3. Finally we conducted a second cohort of computer science co-ordinators, using our findings from the research to see if this impact could be replicated without the research element.

Claims:

Whilst acknowledging the qualifications outlined below and the variables that might impact on any training sequence it is not unreasonable to suggest that the following had a significant impact on the effectiveness of CPD to prepare teachers with the subject knowledge and pedagogical tools for outstanding teaching and learning in computing science?

a) Sequenced, dynamic CPD with gap tasks enables effective CPD for computer science co-ordinators.

b) This type of CPD enables computer science co-ordinators to confidently and successfully deliver effective CPD to raise the confidence levels and ability of staff.

c) This type of CPD can be replicated to other computer science co-ordinators to have high impact on their professional confidence and ability in computer science.

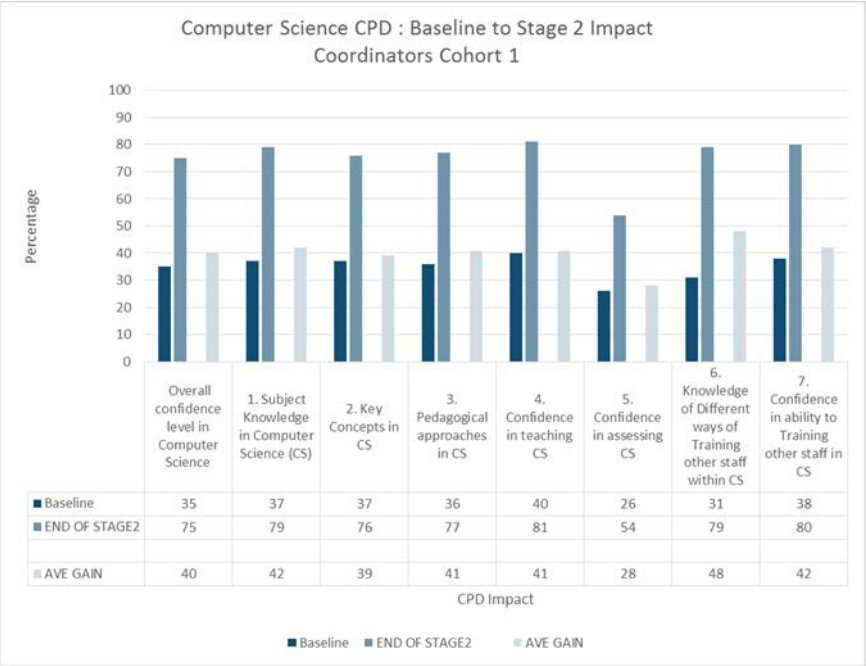
Qualifications:

a) This was not a randomised trial and therefore it wasn't compared to a control group.

b) Whilst the data suggests that this approach to CPD has been effective for colleagues in this project, other forms of CPD were not part of our enquiry and so it cannot be claimed that this approach is the most effective.

c) There is some 'drop off' still under the cascade model from co-ordinators to staff in that teaching staff, while having their confidence raised, it was not to the same extent.

Figure 3: Impact of sequenced dynamic CPD on computer science co-ordinators



Outcomes:

a) The overall confidence level of co-ordinators over a two term period has risen considerably by 40 per cent.

b) The main areas which are involved in the teaching and understanding of computer science have risen on average by 38 per cent.

c) One area that is indicating a lesser growth in confidence is in assessing computer science. This remains as a piece of work for our newly developing computer science learning hubs to work on next year.

d) The confidence and ability of co-ordinators to train their own staff had risen on average by 45 per cent. As this was the aim of the project it would suggest that the three key approaches taken have been forces behind this substantial improvement.

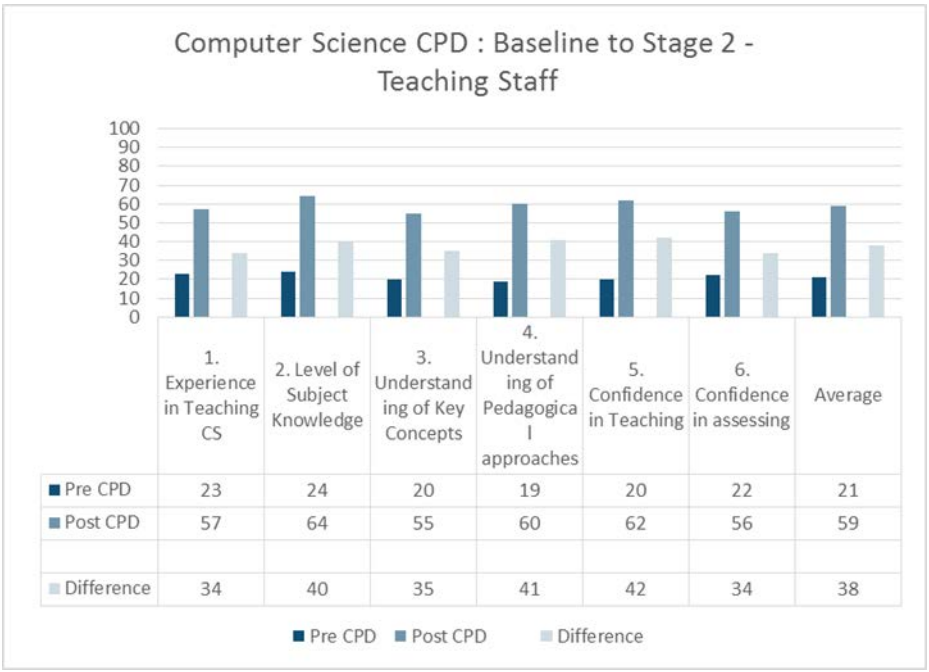
Outcomes:

a) It is clear that teaching staff had a much lower baseline than the co-ordinators. Even so they have made a 38 per cent average gain which is in line with the co-ordinators.

b) There is a similar drop in assessing computer science but now also a drop in understanding concepts behind computer science. Again these are now helpful issues to take forward with our computer science learning hubs.

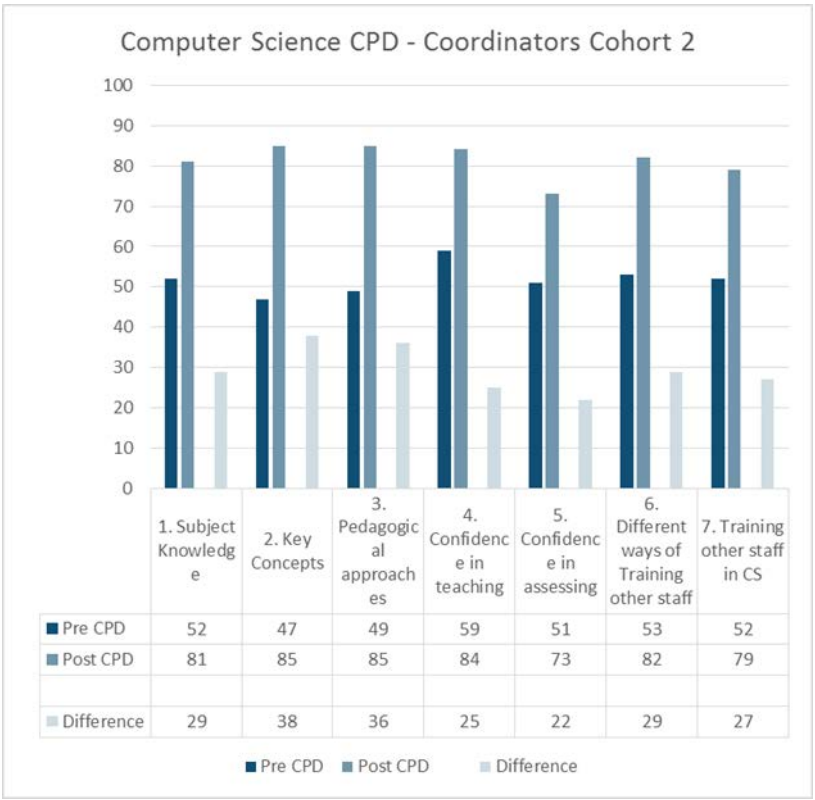
c) The main outcome that is suggested by these results is that the co-ordinators have been able to transfer the impact of CPD through this type of training – which is anecdotally rarely the case with cascade type training.

Figure 4: Impact on teaching staff of sequenced, dynamic CPD carried out by co-ordinators over one term, three sessions



	1. Experience in Teaching CS	2. Level of Subject Knowledge	3. Understanding of Key Concepts	4. Understanding of Pedagogical approaches	5. Confidence in Teaching	6. Confidence in assessing	Average
Pre CPD	23	24	20	19	20	22	21
Post CPD	57	64	55	60	62	56	59
Difference	34	40	35	41	42	34	38

Figure 5: Impact on co-ordinators cohort 2 with replicated training without the research element



	1. Subject Knowledge	2. Key Concepts	3. Pedagogical approaches	4. Confidence in teaching	5. Confidence in assessing	6. Different ways of Training other staff	7. Training other staff in CS
Pre CPD	52	47	49	59	51	53	52
Post CPD	81	85	85	84	73	82	79
Difference	29	38	36	25	22	29	27

Outcomes:

a) Interestingly our second cohort of co-ordinators had a higher confidence level, on average 51 per cent. The reasons for this may just be due to the particular cohort or that they were taken on further in the year when some work might already have been done on computer science within their school or as a result of their own personal development.

b) An average 30 per cent increase was obtained through this CPD. Although this was not quite as high as the research group there were two fundamental differences:

    i) This group was not involved in the process of developing and researching the actual CPD materials.

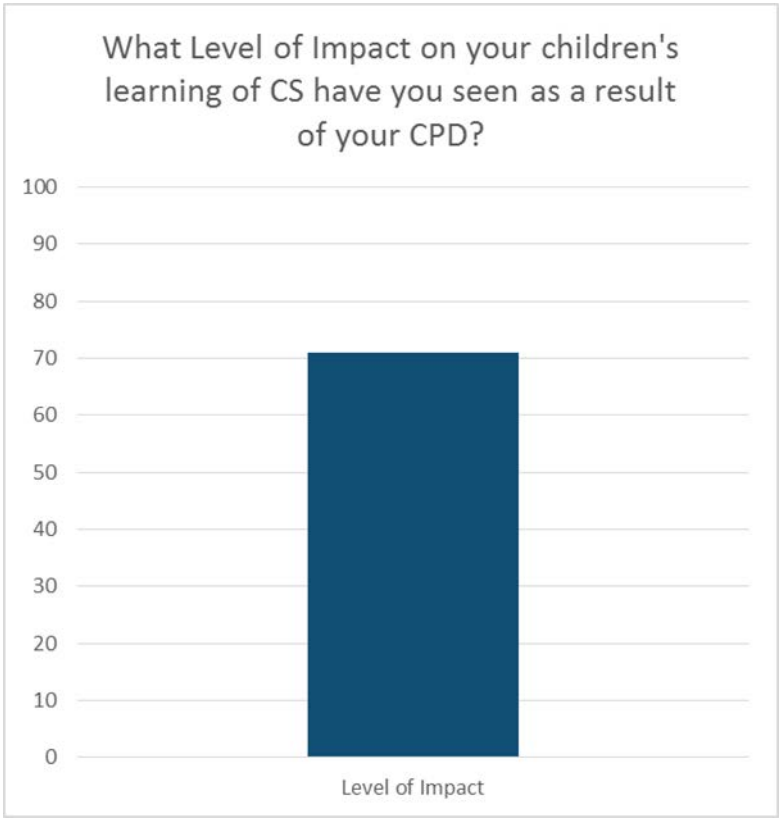
    ii) They had three sequenced events rather than the five the initial cohort had due to the research elements.

c) It is clear that the impact of this approach to CPD was able to be transferred to a new cohort and when linked to their feedback on why they felt this was the case they very much considered the ‘dynamic’ approach to be the key, combined with the use of the master teachers expertise.

Learner knowledge attitudes, skills, behaviours

This stage of the project requires further work next year to demonstrate impact on assessed teaching and learning and therefore the real impact of the CPD. However, teaching staff who have undergone CPD and who have conducted a sequence of lessons with their children have been asked ‘what level of impact on your children’s learning of computer science have you seen as a result of your CPD?’

Figure 6: Level of impact on children's learning of computer science as a result of you CPD



How do your claims relate to the original nine propositions from existing research?

Claim 1 - challenging thinking / changing practice and claim 3 assessment of individual and school needs

It was clear from the initial survey of the types of training that co-ordinators had experienced that CPD had been very 'trainer-led'.

The challenge for co-ordinators was to see the benefits of longer term, sequential training which they could replicate in their own schools to have a sustainable impact. However, the results from their own school staff would suggest that they have been able to achieve this.

One major challenge was the dynamic aspect of the training where the group would help to design the next stage of their training based on their perceived needs. This was a new style of training for all the participants (and their trainers). Interestingly, participants gave this a 95 per cent and 96 per cent rating across both cohorts as impacting positively on the quality of their training. Semi-structured interviews to be conducted will explore this in more detail.

Some difficulties inherent within this dynamic training were recognised by the group:

- They could only suggest from the baseline of what they already knew – they didn't always know what they didn't know, especially in a new area such as computer science. This was partially overcome by the trainers having the expertise and so offering alternatives from which the group could choose.

- It required an expertise and confidence from the trainers to adapt to the needs of the group.

- The group was not always homogenous in its needs. Trainers saw this as positive in that they were able to plan differentiated learning on the next occasion. Having two trainers enabled this to occur, which might not always be the case.

Claim 2 - connecting work-based learning with external expertise and claim 9 - leadership to create the necessary conditions for learning

Fundamental to the success of the project was the use of external expertise and the growth of new expertise and leadership within the schools. This was particularly the case for computer science, which has been a 'secondary' subject until now. The two cohorts gave the use of expertise 98 per cent and 92 per cent very good ratings as impacting on the quality of their training. Expertise was used in three ways:

- The use of a secondary master teacher in computing at the outset enabled the group to see quickly what the central issues were, to have modelled some initial training sessions and to then have access to Computing-at-Schools (CAS) who provided a wealth of resources.

- The expertise of the ITT programme manager was used to support the planning of adult training sessions and the design of the research project.

- Two master teachers were developed from within the group who then took on the leadership of the training sessions. Two further computer science co-ordinators have shadowed the master teachers and have been appointed as SLEs for computing science, thereby ensuring succession.

Claim 6 - joint practice and collaborative learning and claim 8 - professional learning communities between schools

The gap tasks that were agreed and set by the group, such that they all owned them, were key to the development of collaborative learning. The sharing and evaluation of these tasks at the beginning of the next session and the uploading of resources onto the website enabled the dissemination of good practice. It was not expected but both cohorts of co-ordinators have asked for 'learning hubs' to be set up to continue the

professional dialogue and development. This will now be facilitated half termly by the SLEs and master teachers, supported by the website and face-to-face meetings.

The trainers from different schools supported each other in the development of the CPD and did observe and video good practice which was shared within the group.

The group itself would have liked to have furthered joint practice by going into each other's schools. This was beyond the scope of the project but may now be possible through the hubs.

Final conclusions

What have you found out about what great professional development leads to consistently great pedagogy?

- Sequenced, dynamic training with agreed gap tasks and supported by expertise leads to teachers feeling confident in their pedagogical approaches to teaching computer science.
- There is a need now for these approaches to be fully tested in the classroom for their impact on pupil outcomes.

What have you found out about how to engage in collaborative R&D?

- The involvement of experts in conjunction with the collaborative group in the design and redesign of the project leads to clarity, momentum and ownership.
- Having data 'staging' points throughout the project enabled progress to be reviewed and a clear focus kept.

What have you learnt about the nature of collaborative enquiry that brings about improvement for pupils?

- This is the second stage of the project that we wish to pursue next year. This year we have focused and concentrated on the CPD aspect of our research question in order to then impact on pupil progress.

How will you ensure your learning is shared and sustained going forward?

- Research disseminated at south west teaching school conference in July 2014.
- New co-ordinator cohort to begin October 2014 run by two new SLEs.

- Computer science learning hubs set up in two areas of Devon to continue work around impact on pupils and their assessment as well as design of curriculum resources to be put on website.

- This pattern of training is being applied to other areas of our CPD work – eg our new NQT development programme.

A wider perspective, a question and the future:

- As a teaching school we are fully committed to and are excited by the impact of evidence-based research upon all aspects of our work. The process of research is seen as a fundamental growth point for all of our practitioners from ITT to headship and all points in between.

- Our learning from this project has been immense and we would like to thank staff at the Institute of Education, the NCTL and the Department for Education for the opportunity to be involved.

- The computer science research project had one indirect and unintended consequence. As co-ordinators have carried out their CPD over a period of time they have forged trusting, supportive relationships. At the end of each cohort they have asked to continue to meet so that they can continue their work together. We have therefore set up computer learning hubs in three areas of Devon in order to facilitate this and have appointed master teachers and SLEs in computer science to support them. They will be able to take forward the key elements of assessment and pupil outcomes. In many ways, this demonstrates the true value of research in the commitment and desire to improve coming from within communities of researchers in a collaborative way.

The Fylde Coast Teaching School Alliance

Alliance name	The Fylde Coast TSA
Alliance context	The alliance is made up of 14 schools, organisations and HEI partners.
Schools involved in the R&D project	From the Fylde Coast TSA eight schools volunteered to be part of this project, these included: two primary, four secondary, one sixth form college and one special educational needs all-through school.
Research focus	Coaching and transition in relation to teacher practice.
Research question(s)	How effective is cross institution coaching in raising attainment generally and in particular in addressing issues of transition from primary to secondary and from secondary to sixth form?

Rationale / context

The R&D coaching project was established to offer teaching staff the opportunity to work with colleagues from different educational institutes across the Fylde Coast TSA to improve professional practice, develop teaching and learning and enhance professional development.

Coaching is widely recognised as an effective way to raise staff performance and consequently pupil and student attainment. In this context, coaching operates between peers and is therefore non-judgemental and outside the normal hierarchy of traditional school / college CPD and mentoring. The Fylde Coast TSA has instituted a standardised coaching practice across alliance members from July 2012, by ensuring the training provider remained the same across each organisation.

The project is a two-year study into the development of an effective and sustainable coaching infrastructure allowing staff to support each other and share good practice across institutions. Sustained, as the year 1 coachees became coaches in year 2.

The coaching co-ordinator, who has worked as part of the SLT at Hodgson Academy and now an independent coaching consultant and R&D co-ordinator, head of department and SLE, have worked collaboratively, to design the feedback proforma of the coaching project.

This enabled the co-ordinators and the co-director of teaching school to establish a clear vision; discuss and agree specific timelines; and to ensure that effective communication systems were in place for the project.

The coaching project design

The R&D co-ordinator working with the external facilitator from Sheffield Hallam University explored the complex issue of how progress from the coaching project could be measured; the need for the collation of base data along with establishing a genuine collaborative approach to the project as a key method for success. According to; Eaker, DuFour & DuFour (2002: 26), 'what is collaboration? A systematic process in which we work together, interdependently, to analyse and impact professional practice in order to improve our individual and collective results'. This interdependence has helped shape the project. Valuing the individual to work in a group with a shared goal has been a main focus of the project. We were particularly interested in discovering if there were:

- any shared goals or desired outcomes from the coachees
- shared areas for development or challenges
- any similarities or differences
- could any further analysis be drawn from capturing this data?

Section five of this report details the findings to this investigation question.

The implementation team for Fylde Coast TSA stated, due to accountability and confidentiality, that lesson observations, performance management reviews and student results could not be used as measurable indicators in the coaching project. This therefore raised the following questions:

- How would the outcomes of the coaching project be measured?
- How could we track success?
- Does coaching have any influence on teaching, learning and assessment? If so, how do we measure this?

A recurring theme discussed at length in our action learning set (ALS) was how data could be used which was qualitative, rather than quantitative to share findings. Answering the questions surrounding how the project could be measured and accessed. This opened up a broader spectrum of opportunities of how feedback from coachees and coaches could be sourced and analysed. Without using quantitative indicators such as; performance management reviews, Ofsted lesson observation

grading criteria, Ofsted framework and other conclusive, performance indicators, which are so commonly used in education today.

The coaching model

Stage 1 of the project involved coaches and coachees from the same schools being paired up, to enable effective monitoring and review of the coaching process, gaining feedback and making any amendments before the project went cross phase and across institutions. The purpose of the project being to:

- enable staff to experience the GROW (goal, reality, options and will) coaching model, a less complex, user friendly, coaching model, already familiar to numerous schools in the alliance, to develop teaching practices, in a non-performance management related way

- explore new strategies and techniques and engage in professional conversations with colleagues, with whom they may not normally associate.

According to Palmer & Stough, (2008): ‘coaching is not about imparting expert knowledge in a particular field. Instead it is about guiding individuals in self-directed learning and development. The coach may not have specific expertise in the area of influence of the person, but they are able to assist the individual in maximizing their influence’.

This definition of coaching provides a framework for how the coaching model may be beneficial, particularly to teachers working across a TSA.

The GROW coaching model also provides a framework for discussion that can be used to develop teaching, learning and assessment. Teachers learn by considering past, present and future strategies and establishing clear goals through detailed discussions. According to LSIS (2009), “the GROW model developed by John Whitmore (2003), provides a model of coaching that aims to unlock potential following a cycle that explores the **goals, reality, options** and **will** to commit.

The coaching project – stage 1

From the Fylde Coast TSA, eight schools volunteered to be part of this project, these included: two primary, four secondary, one sixth form college and one special educational needs all-through school. The coaches were selected by senior management teams, from each establishment and provided with training on the GROW coaching model. The coachees were then selected and introduced to their coaches and the outline of the project was explained.

During a 10-week period the selection of participants and the collation of feedback took place. During this time the coaches and coachees took part in the four-stage process, which included an initial meeting, a coaching session, classroom coaching session and completion questionnaire. Coaches also attended three forum meetings to discuss the process and provide feedback to the coaching and R&D co-ordinators. These meetings proved vital in establishing a collaborative approach to the project. Coaches were to able have an input into the design and implementation process, which made a real difference and contributed to creating a positive culture for coaching to develop. Developing the collaborative nature of the project was a key target, accomplished by holding a series of forum meetings, sharing views and ideas, wherever possible, developing the collaborative culture of the project.

The coaching project outcomes – stage 1

The feedback from the initial phase 1 of the project revealed some interesting findings. First the format by which the feedback was collated was fully reviewed to enable the R&D co-ordinator to collect and use some qualitative data. Second comments and feedback from both coachees and coaches revealed that:

- 89 per cent of coachees stated that they achieved their initial desired goals
- 78 per cent of coachees stated that they took risks during the classroom coaching session, which they may not have considered otherwise

Thus indicating that the coaching project challenged teachers to step out of their comfort zones. In addition:

- 44 per cent of coachees identified behaviour management as an area they would like to develop
- 33 per cent wanted to focus on AfL
- 22 per cent wanted to focus on questioning techniques

These common themes regarding areas for development were equally as interesting as the areas of strength with 78 per cent of coachees identifying these as being able to quickly establish relationships and rapport with students.

Recommendations for stage 2

The next phase of the project required coaches to work with coachees from different educational institutions. The feedback booklet used by coachees and coaches was simplified to enable further analysis of feedback, which could feed into the R&D of the project. Forum meetings were arranged with both coaches and coachees, to gain feedback and ensure a truly collaborative approach.

The R&D enquiry focused specifically on how coaching in the classroom can impact on teaching, learning and assessment. The next phase of the project aimed to further analyse this line of enquiry, as well as looking at how effective cross phase, cross institutional coaching can be and what can be learnt from further expanding the coaching programme.

The coaching project outcomes – stage 2

- 90 per cent of coachees agreed that they had achieved their desired goal from being part of the coaching project
- 50 per cent of coachees felt able to take risks in the classroom

An emerging theme was the confidence of the coachees arising from having an external coach from another institution as this enabled coachees to develop trust, work collaboratively and take risks as there was no judgment being made. Below is a quote from a coachee from stage 2 of the project:

> I would certainly recommend the experience, it took up minimal time but had maximum output. There was a real focus on improving practice and I felt fully comfortable at all times. I thought it was particularly beneficial to work with a coach from another school.

Final stage of the coaching project

The final stage of the project included eight pairs of coaches and coachees, with eight participating schools / colleges; three primary schools, three secondary schools, one special education school and one sixth form college. The sustainability of the project relied on the coachees from stage 1 being trained and becoming coaches for the final stage, to a new cohort of coachees. All eight of the coaches in the final stage were coachees in phase 1 of the project.

In summary:

- 100 per cent of the cohort agreed that they achieved their desired goals during the project

- 100 per cent felt that they had taken risks during the coaching lesson
- 100 per cent of participants agreed that they would positively change areas of their teaching as a direct result of their involvement in the project
- 86 per cent strongly agreed that they would like to participate in a coaching project in the future
- 14 per cent agreed they would also like to participate in another coaching project in the future
- 100 per cent of the cohort agreed that the project was well organised and that their involvement in the project was worthwhile
- 100 per cent of coachees agreed that they would not only recommend someone else taking part in a coaching project but that they would be interested in becoming a coach in the future

From the feedback, the following areas were identified as areas of strength prior to the coaching project:

- questioning was identified by 20 per cent of the cohort as being a strength prior to starting the project
- 40 per cent considered rapport, planning and communication as strengths prior to the coaching
- 60 per cent regarded behaviour as a key area they wanted to develop as a result of their involvement in the coaching project.

This varied from engagement to independent learning and classroom manners, all areas for development. This coupled with literacy, stretch and challenge and using electronic feedback were all areas coachees wanted to develop whilst working in the project during this final stage.

> I feel that it has been a beneficial process and that it has made me think about my teaching. It has been good to reflect on the targets established at the start of the process, and consider how to develop my practice further, something which should be continuous in this profession. I would participate in the coaching in the classroom experience again most definitely!
>
> coachee

> The lesson feedback conversation allowed “X” the chance to reflect and discuss the session and “X” respected the point that no judgement was made. “X” was very happy with the coaching process.
>
> Coach

Impact: economic, CPD, culture and outcomes

Economic: one benefit of this project is that the only cost is to allow staff the time to participate. It is a sustainable project in that the coachees from stage 1 and 2 become the coaches for the final stage. 100 per cent of coachees who become coaches have enjoyed the transition from coachee to coach and felt that that career development in terms of CPD has been extremely worthwhile.

Bespoke professional and personal CPD: due to the nature of the project being one-to-one, the CPD is bespoke to the individual creating greater ‘buy in’ from participants. The non-judgemental element of the project is fundamental to its success. According to Professor Black, ‘comment-only marking provides students with a focus for progression instead of a reward or punishment for their ego (as a grade does)’, (Presentation on AfL September 2013 BSFC). Applying this same theory to teachers and **their** assessment for **their** learning has been revolutionary. When the coachee becomes the coach, they can share their experiences from a first-hand perspective and the non-judgemental nature of the project is embedded further, building trust amongst the coaching pairs and in the project itself.

The leadership competencies which have been perceived as being enhanced as a direct result of involvement with this project include the following outlined by the NCTL:

- self-awareness
- integrity
- resilience and emotional maturity
- conceptual thinking
- delivering continuous improvement
- modelling excellence in teaching
- learning focus
- serving others

- inspiring others
- partnership working
- relating to others
- developing others

The success of the first cohort is evidenced in the percentage of coaches and coachees who were successful in gaining promotions following their involvement with the project. 70 per cent of coaches gained senior leadership positions and 50 per cent of coachees gained promotions into middle leadership. The feedback from these staff was that the R&D coaching project had been a positive point for discussion during their interviews for their new posts.

Cultural: The collaborative nature of the project from all involved has enabled participants to have shared ownership and develop ideas together.

This freedom to challenge oneself and try new things has made a shift in cultural perceptions of developing teaching and learning. When asked, “as a result of your coaching experience are there any areas of your teaching that you will change?” 100 per cent said yes.

Having a coaching co-ordinator and a R&D co-ordinator was a crucial element of the project’s success, helping drive forward the project and draw reflections from the process. The coach and coachee forum meetings enabled the cohort to meet and share experiences and good practice which was important to keep the project moving forward, particularly as the project is across several institutions.

Outcomes: At the end of the two-year project we were able to access the long term impact on teaching and learning, from learner voice feedback. The coachees and coaches forum meetings allowed us to discuss how the students reacted and responded to the coaching in the classroom and the innovative practice which was being developed. The response was hugely positive with students expressing that they felt learning had become more fun, engaging and structured. Enabling them to progress at a quicker rate and they felt the tutor had more control in the classroom. This concept of coaching in the classroom has shone out as real innovative practice, one where the coach and the coachee can discuss the concerns and areas for development from a closer perspective (in the classroom) helping build rapport and trust, progressing teaching and learning and further creating a culture of collaborative professional development.

We had hoped to review teaching and learning lesson observation grades as a result of this project but as annual lesson observations had already taken place this data

was unavailable. We had hoped to capture lesson observation grades data in this new academic year but due to most of the coachees moving into new posts this was unachievable.

References

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Palmer. B, and Stough, C (2008) *Genos: Enhancing Emotional Intelligence.* Version 14, April (2008) Melbourne, Australia

Harton Teaching School Alliance

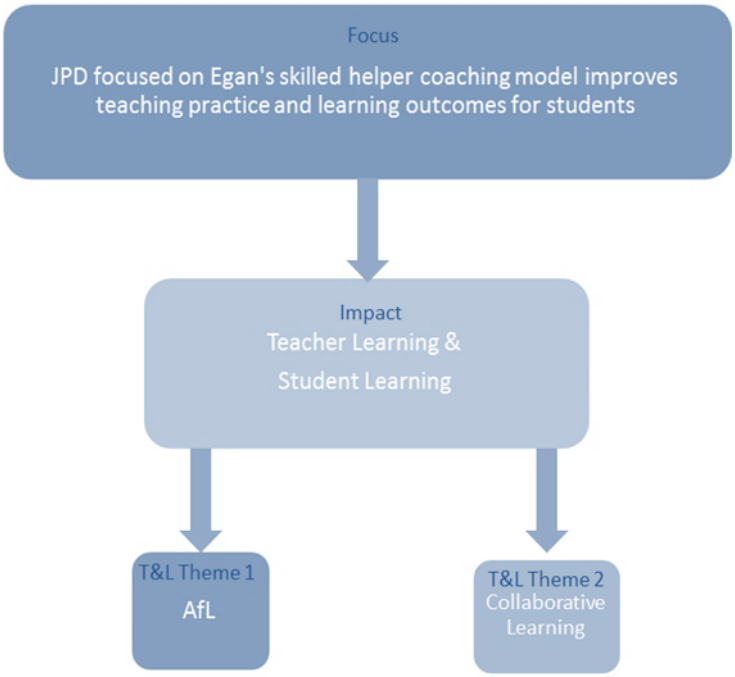
Alliance name	Harton TSA
Alliance context	Based in the north east, the alliance works in strategic partnership with schools, HEIs, providers of CPD, the local authority and schools across all phases.
Schools involved in the R&D project	There are 14 participants from 4 different schools (3 secondary schools and 1 primary school) involved with this project. The participants involved teach within different curriculum areas as well as to different key stages. The teachers involved teach either KS2, KS3, GCSE or A-Level students. All participants are volunteers who had expressed a wish to enhance their practice as well as develop their observation and coaching skills further
Research focus	The project focus is to evaluate 'if JPD focused on Egan's skilled helper coaching model improves teaching practice and learning outcomes for students'.
Research question(s)	What makes great professional development which leads to consistently great pedagogy?

The implementation phase

Research aim

Working in partnership with the NCTL, the Harton TSA designed a R&D project to evaluate the impact of using new technologies to support JPD. As part of this project we aimed to evaluate 'if JPD focused on Egan's skilled helper coaching model improves teaching practice and learning outcomes for students'. The project focused on two main teaching and learning themes (AfL and collaborative learning) and participants involved worked as 'JPD couples' to focus on one of the two teaching and learning themes.

Figure 7: Project overview



Intended impact

- Staff to develop a clear understanding of effective pedagogy as a result of JPD. Staff will develop / enhance their teaching practice further through observing, reviewing and coaching, using Egan's skilled helper model as a tool for reflection.
- Staff to share their good practice/skills developed with other colleagues within their own schools so the project becomes sustainable and embedded within the Harton TSA teaching and learning community.
- Enhance student learning by focusing on developing aspects of pedagogy which engage, challenge and inspire students to make progress. Students will be encouraged to think about their thinking and enhance the progress that they make.

Who was involved in the project?

The 14 participants from 4 different schools involved with this project were all volunteers who had expressed an interest / desire to enhance their practice as well as develop their observation and coaching skills further.

None of the participants involved were members of any SLT as it was felt that it was important to separate this coaching approach from any performance management programme running within schools.

The innovation phase

What strategies were used?

The agreed strategy to facilitate this JPD process was the use of Egan's skilled helper model as the coaching tool and an application that develops lesson observation and feedback skills. Egan's skilled helper model was chosen as the coaching tool as it has clear guidelines / steps to follow within the coaching process. It allows staff to identify any areas they wish to develop, create opportunities where this can happen and move towards the action that will lead to improved outcomes. There are three main questions that participants need to use throughout this process:

1. What is going on?
2. What do I want instead?
3. How might I get to what I want?

The app was chosen as it is designed specifically for teachers who want to participate in peer observation and coaching in order to understand, reflect upon and develop their own practice. All participants were provided with the opportunity to receive training in how to use Egan's skilled helper model and the coaching app to facilitate the coaching process.

How was evidence collected?

Evidence was collected from both staff and students in three main ways; use of questionnaires, learning logs and review meetings.

Staff completed a baseline questionnaire (see table 1) where they had to scale (from 1-10) their **knowledge of, understanding of** and **practice of** their chosen teaching and learning focus; this then provided a baseline for staff to work from. Staff had to support their 'scaling' with a comment to explain their thinking about the 'mark' awarded. As part of an interim review (which took place at the end of year one) and a final review (which took place at the end of the project) staff returned to their questionnaire to assess their **knowledge of**, **understanding of** and **practice of** their chosen teaching and learning (T&L) focus.

Table 1 Staff baseline questionnaire

Practice – please scale your **teaching practice** in terms of collaborative learning. Write the date to show each stage of the programme, giving a reason or example for your choice.

Staff baseline questionnaire										
Scale	1	2	3	4 **X**	5	6	7	8	9	10
Baseline assessment Launch event Date:	Collaborative learning is something that I use for many tasks, with the children sharing knowledge and listening to each other to complete their tasks. Some children find it difficult to listen to each other and often within the group there will be dominant children and those who tend to sit back. Finding a way to have all children equally involved will develop my effective use of collaborative learning in the classroom. I would also like to consider how to ensure the children listen to each other effectively.									
Spring 2013	1	2	3	4	5	6 **X**	7	8	9	10
Interim review Date: 11.02.13 Date 25.09.13	Children are beginning to listen to the ideas of others in the group through the use of lolly sticks. They can organise themselves jobs within the group but perhaps a simple chart (showing children's photos) could be used to formalise this, as some children do tend to fit between jobs. It was also discussed during coaching session how the size of the groups and the number of jobs for the given task should be considered, as some children were not always active despite wanting to have something to do. Again, how the children actually collaboratively 'learn' from each other is something to be developed. Smaller working groups has enabled all children to be collaboratively involved and the children allocating jobs within the group is successful. Children are beginning to learn from one another but ideas on how to monitor need to be developed.									
Autumn 2013	1	2	3	4	5	6	7	8	9	10
Interim review Date:	Give reasons / explanation for your choice.									
Summer 2014	1	2	3	4	5	6	7	8	9	10

The staff questionnaire was designed to be a diagnostic and developmental tool that was used to clarify the difference between impact on knowledge and impact on practice.

The questionnaire was designed to establish a continued journey in terms of developing as a teacher, in other words it is a journey with no final destination. As such, the numbers on the scale are not as important as the descriptions which were given.

Staff identified a class they could use throughout each academic year of the project and each class completed a student questionnaire (see figure 8) – this questionnaire related to the T&L focus chosen by their teacher. The results from this questionnaire established a baseline of understanding of individual students in the class as well as the class as a whole.

Figure 8: Student baseline questionnaire

Student Review

Name:	
Teacher:	
Class/Subject:	
Date:	

We would like to gather some information about your learning. Please help us by answering the following questions. For each question you need to **circle** the number which is the most suitable answer.

1. I get a chance to work with other pupils in this lesson.

1	2	3	4
Rarely	Sometimes	Most of the time	Always

2. When working in a group I help other people learn

1	2	3	4
Rarely	Sometimes	Most of the time	Always

3. When working in a group other people help me learn.

1	2	3	4
Rarely	Sometimes	Most of the time	Always

4. We do a range of different activities in our lessons.

1	2	3	4
Rarely	Sometimes	Most of the time	Always

5. I cooperate well when working as part of a group

1	2	3	4
Rarely	Sometimes	Most of the time	Always

Again, as part of the review process, students were provided with the opportunity to complete this questionnaire again to help establish if/how their attitude and skill base within each T&L theme had developed. The student 'review period' took place alongside the staff review period. The main strength of using both the staff and student questionnaires enabled numerical data to be collected as well as anecdotal information. As part of the coaching process staff kept a 'learning log' (see figure 9) to summarise specific details from their coaching observations / conversations and what action was to be taken as part of this process. The learning logs were a personal record for each participant from which anecdotal information was collected.

Figure 9: Staff learning log

Event	When	Action to be taken by participants	Action to be taken by HH
Launch Event	Term 1 (Summer 2012)	All participants to attend the launch event to be introduced to the project, to receive coaching training and how the technology could be used.	Example: HH to lead (along with JM) the launch event. HH to establish both in school and cross school coaching couples.
Event	**When**	**Action to be taken by participants**	
In school coaching	Term 2 (Autumn 2012)	Participants to complete the coaching cycle with their 'in school' coach. Students in complete review questionnaire. HH to arrange a Keep In Touch (KIT) visit/call for each coaching couple.	**Date of lesson observation** Example: HH to observe JM on 18.10.12 (p1) **Date of coaching conversation** Example: 23.10.12 (p3) **Agreed coaching focus** Example: to focus of developing literacy skills, using VCOP sheets as a resource.

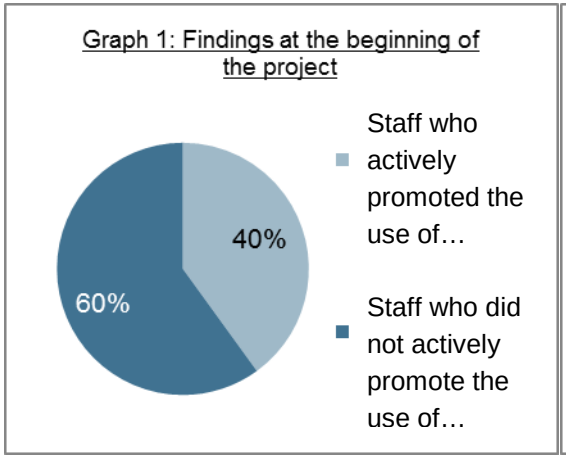
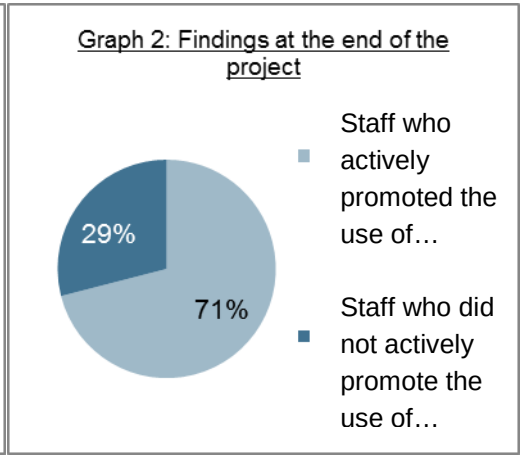
Review meetings were held to support the collaboration element of this project. Each meeting enabled participants to openly share how the coaching process had changed their teaching practice and the learning outcomes of their student. As part of the review meeting cycle teaching ideas that had been used or observed as part of the coaching process were discussed and consideration given to how these ideas could be developed to further improve the learning outcomes for the students.

The impact phase

Our collective claim 'JPD is proven to improve teaching practice and learning outcomes for students' is linked to two of the nine claims:

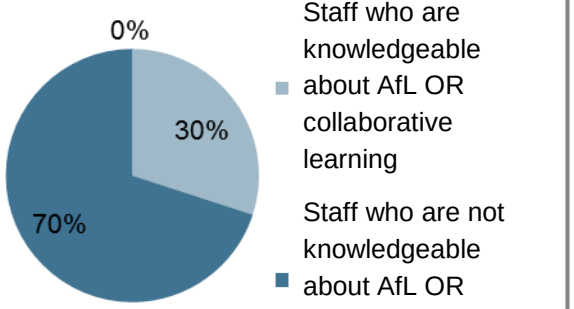
- **Claim 7:** when colleagues share and co-construct ways of developing their practice then their students are more likely to have a 'can do' attitude, be engaged in the learning process and ultimately improve their own performance. By creating an open, non-threatening and supportive observation/coaching process staff can develop powerful and effective professional relationships that are beneficial for everyone involved.

- **Claim 8:** by creating focused collaborative professional learning communities professional development will become sustainable and research will be successfully disseminated. This in turn will allow a professional learning culture to become established so staff can share ‘new learning’ (and any appropriate resources) with others and identify how this ‘new learning’ could be integrated/adapted into existing practice.

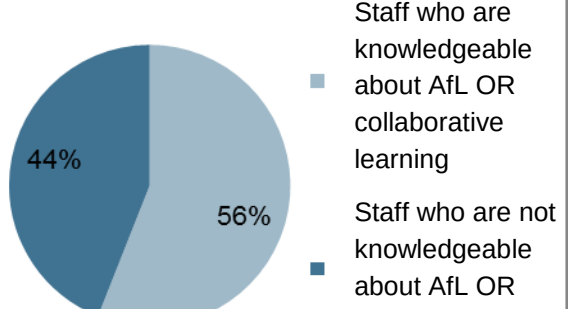
What has been the impact on staff…	
…knowledge and practice	**…attitudes**
The use of coaching has had a positive impact on both the teaching practice of staff involved as well as on their knowledge of the chosen teaching and learning themes. At the start of this project 40 per cent (a baseline figure) of the staff thought that they promoted the uses of either collaborative learning or AfL into their teaching practice (see graph 1 for a summary). In comparison to this 71 per cent (see graph 2) of the same staff commented that there had been an "improvement in the use of AFL within my teaching practice since the beginning of this project". They reported that they now "feel more confident to carry out group work within their lessons" and that "group work is being used more and more in everyday lessons compared to only being used once or twice per term."   Graphs 3 and 4 highlight that 44 per cent of the staff (at the end of the project) compared to the initial 30 per cent (as the baseline figure) feel that their knowledge of either collaborative learning or AfL has developed but this is something that they "would like to enhance even further." Some participants have expressed a wish to "never reach a 10/10" when grading their future development and understanding of their chosen teaching and	Staff identified that there are many benefits to engaging in the coaching process. They commented that it is "non-threatening, supportive and provides the opportunity and freedom to talk." Participants commented upon the fact that they benefitted from the "non-judgemental feedback" they received from their coach, which in turn helped them to make informed decisions / improvements for their students. Many felt it provided time to reflect upon an issue which is something that is not always possible. Using Egan's skilled helper as the coaching model has been very effective as the participants feel that it is a less formal way of conducting observations and as a result of this they feel that this is "a

learning theme “as I dread the idea that there would be nothing left for me to learn” or “there are always new strategies that can be used. This is why research is so important”. When comparing the initial baseline questionnaire to the review questionnaires it was interesting that some staff had awarded themselves a lower mark as part of the interim review process. However when reading the justifications for their ‘mark’ it became apparent that staff had now developed a deeper understanding of their focus and its purpose.

Graph 3: Initial findings about staff knowledge of chosen T&L theme



Graph 4: Findings about staff knowledge at the end of the project.



Staff valued the external nature of feedback and the sharing of good practice. They reported an “increase in their own confidence” and felt “invigorated by the positive feedback” received as part of the coaching process. They reported that they are “now not only supporting their ‘coaching couple’ but that they are also planning some of their lessons together.”

Staff have found the app “really simple to use during the observation” and they have described it as being “an excellent resource.” They felt that the feedback “gave a focus for the coaching session,” “was easily shared with their coaching partner” and “it helped identify areas to develop.” The use of the app to assist with the observation / feedback process has been more effective for some staff than others. Some staff have said that it has enabled them to “develop lesson observation and feedback skills” whereas others have a “fear” of using

less stressful” approach that encourages them to “want to improve” and “have an open door to their classroom.” This process has provided staff with “time to think and reflect on what I do.”

Staff remarked that the peer observation process has not only “improved my confidence, but it has also had a positive impact upon the behaviour of my students.” They felt that peer observation creates a “domino effect” “as others who have observed you do an activity, repeat this activity in their curriculum area, so it becomes something that students get in a variety of subjects/situations.” Peer observation and coaching established positive working relationships and a “can do” culture for both staff and students.

new technologies however once they have had the opportunity to use this tool and understand that it can only be viewed by the coach and the coachee then they have started to feel more confident with the process.	

What has been the impact on student…	
…knowledge and practice	**…attitudes**
When looking at the student data who were involved with the AfL theme 99 per cent (at the start of the project) stated that they were **always** provided with written advice about how to improve their work and 1 per cent thought that they were provided with written feedback **most of the time.** All students commented that they were encouraged to think about how they could improve their work but 61 per cent identified that they **sometimes** provided with an opportunity in their lesson to make improvements to their work and only 22 per cent suggested that they were provided with improvement time **most of the time**. In comparison 47 per cent (compared to the initial 22 per cent) of the same students report that they are now provided with lesson time to improve their work **most of the time.** Students have commented that using the new marking strategy of www (what went well) and ebi (even better if) feels more "non-threatening" and it has enabled them to be more "confident when reviewing my own work and the work of my friends." In addition to this their students commented that they felt "more relaxed" during the observations process and that their teachers were "encouraging me to think about what I am doing as well as how I am doing it."	Students from KS2 to KS5 participated in this project. At the start of the project 8 per cent of the students questioned suggested that they **rarely** get a chance to work with their peers in a lesson compared to 52 per cent who stated that they **sometimes** get a chance to work with others. Further to this 21 per cent of students identified that they are provided with a chance to work with others **most of the time** and the final 19 per cent thought that they were **always** provided with an opportunity to work with their peers. Further analysis of this data suggested that more opportunities were provided for KS2 and KS3 students to work together in comparison to KS4 and KS5 students. When questioning some of the older students (at the start of the project) as to why collaborative learning was more limited, they thought that it was related to their exams and some suggested that they "prefer to work independently and not with others." Students have commented that they feel that their teachers are "encouraging me to think about what I am doing as well as how I am doing it" and that it is "good to see teachers working as a team."

Final conclusions

As an alliance we are passionate about building a culture of R&D and hope to add to our existing ethos which encourages staff to develop a clear understanding of effective pedagogy as a result of JPD. This enables staff to enhance their teaching practice further through observing and reviewing teaching practice **and** sharing findings with other colleagues so that evidence-based teaching becomes sustainable and embedded within the alliance teaching and learning community of the alliance. This project suggests that when staff are given ownership of their own CPD they are more likely to commit to and continue with their 'learning'. They felt invigorated by the coaching process as it is a supportive tool when conducting observations. As a result of this experience they felt that coaching was "a less stressful" approach that encouraged them to "want to improve".

In conclusion the evidence collected supports our collective claim that JPD is proven to improve teaching practice and learning outcomes for students.

London West Alliance

Alliance name	London West Alliance
Alliance context	The London West Alliance has grown in 3 years from 15 to 34 schools – with equal numbers of primary and secondary schools. These schools are spread across five London boroughs and include schools from 'outstanding' to 'requires improvement'. The alliance has engaged heavily in the development of routes into teaching in which participant research is an important component at Masters level, teaching and learning programmes and school improvement programmes.
Schools involved in the R&D project	Lampton Academy
Research focus	To explore through three professional development projects the factors which influence changes in teachers' practice and to examine more precisely the role of peer collaboration within the context of such change.
Research question(s)	Does 'deliberative practice' support long term development in teachers' classroom practice? How does teacher professional learning education contribute to school improvement in a school 'in challenging circumstances'? To what extent does a critical thinking based pedagogy support higher level outcomes at A-level?

The implementation phase

Lampton Academy led the project, drawing on three professional development studies it was conducting as part of its role as a teaching school. All three projects had arisen from specific needs identified through on-going school self-evaluation, as encapsulated in claims 1 and 3 (Stoll, Harris and Handscomb, 2012).

These could be said to represent development at three different levels ranging from the broad to the very specific: institutional and cultural change towards professional learning in order to help raise achievement in a school in challenging circumstances (project 2); developing pedagogy in order to help raise achievement within a

particular cohort context, namely in the sixth form (project 3); and at the level of the individual teacher, focussing on a very specific self-identified aspect of his / her practice as a means of developing a personalised and enhanced form of professional learning for experienced teachers already identified within their school as excellent practitioners (project 1).

Whilst these are three distinct projects, it was felt that, collectively, they would provide a rich evidence base from which to draw conclusion about effective professional learning by examining shared features across each project's findings. All three projects were constructed around the Kolb learning cycle (Kolb, 1984) and had collaborative learning activities as a core feature, as outlined in claims 5 and 7.

What were the intended outcomes of the project?

The intended outcomes for staff included: increased confidence and self-belief in their own capacity to improve and to be the agents of that improvement due to the opportunities for improving practice in supportive, reflective, low-risk environments. Teachers would have developed a critically reflective understanding of pedagogy and practice, and, in some cases, the role of research literature to inform that understanding. Teachers would be adept at identifying specific aspects of their teaching which would have improved/developed as a result of the projects they have been involved in.

The intended outcomes for pupils included: improvement in the quality of learning across all three projects as demonstrated through observation data; student feedback; and student outcomes (work produced). Formal examination results originally formed part of the data for project 2 although this has proved an unreliable source given the impact of a range of factors extraneous to the research projects on exam performance.

What evidence did you gather at the baseline stage and what did this tell you?

Baseline data collected included: baseline interviews and questionnaires with teachers to ascertain teacher understanding, attitudes and classroom contexts; documentary evidence (Ofsted reports; school evaluations; exam specifications); student achievement prior to CPD intervention.

Across the three projects there were distinct baseline findings related to the specific nature and context of the project.

However, these can be synthesised broadly into shared themes relating to: knowledge and understanding of pedagogy; knowledge and understanding of professional learning; emotional factors; teacher-student dynamic and its impact on learning.

Project 1: deliberative practice

Context: excellent practitioner group made up of 12 teachers facilitated by an SLE who had researched ‘deliberative practice’. The sophistication of responses in baseline data reflects the profile of the group.

Knowledge and understanding of pedagogy

A key theme arising from baseline interviews included a concern over students’ superficial understanding of lesson content; a need to find ways to engage them with lesson content at a deeper intellectual level; and approaches to support students’ ability to retain their knowledge and to apply their understanding.

Knowledge and understanding of professional learning

There was recognition of the importance of being given the time and opportunity to engage in deep professional learning as presented by the deliberative practice group. There was a positive reaction to the fact that this acknowledged their expertise and, equally importantly, their entitlement to develop even further. Such opportunities, in turn, served to motivate them. They recognised that for such learning to be useful and truly developmental, it was imperative to choose a genuine challenge and not to be afraid of it going wrong.

Emotional factors

There was a desire to be able to try out new ideas in a risk / judgement free environment and an expectation that the predominant culture of the group they were forming at the start of the project would be a supportive one.

Teacher learning – student learning dynamic

From the start there was recognition of the link between the impact of teacher learning on student learning by teachers not ‘blaming’ students for their superficial engagement with content. ‘If we want students to change, we have to change how we teach’ illustrates an understanding of the link between what teachers do in the classroom and what students learn.

Project 2: school improvement

Context: baseline school data; expected progress (EP) in mathematics 57 per cent; expected progress in English 38 per cent. Ofsted Nov 12 ‘special measures’ with achievement rated as ‘inadequate’ and quality of teaching 'inadequate’.

Knowledge and understanding of pedagogy

Analysis of quality of teaching from internal and Ofsted reports indicated an insufficient range of strategies used to increase students' active involvement in lessons; lack of differentiation to meet individual needs in lessons; slow pace; and that levels of expectation and challenge were not high enough.

Knowledge and understanding of professional learning

There appeared to be uncertainty amongst leaders on how to develop a pedagogy that would support 'deep' learning rather than an approach based on superficial 'tricks' or 'top tips'.

Emotional factors

Across the school there was a lack of self-esteem and low professional pride which accompanies a school deemed to be 'inadequate'; and a culture of fear where visiting classrooms was seen as threatening and judgemental.

Teacher learning-student learning dynamic

There was a lack of confidence in terms of "what we can do with these students" manifested in a concern expressed by teachers of what would happen in lessons if they did increase the pace and challenge.

Project 3: developing a critical thinking based pedagogy for A-level teaching

A group of 10 A-level teachers from across three schools participated in a critical thinking training programme based on Richard Paul's Critical Thinking materials[2]. Three of the group were followed up with observations and further interviews.

Knowledge and understanding of pedagogy

Whilst all teachers acknowledged that the ability to think critically in the context of their subject was essential for A-level success, they varied in ability to precisely articulate what they understood 'critical thinking' to mean. Whilst teachers were very clear on the content requirements of their A level courses and how to teach it they were less clear on teaching the processes of critical analysis and evaluation – even though they appear explicitly as specific requirements in the A level specifications across all subjects featured in the project and are required for top band performance.

[2] www.criticalthinking.org

Knowledge and understanding of professional learning

Baseline data indicated a more ‘functionalist’ approach to professional learning with an expectation of being given a ‘formula’ or ‘checklist’ for A/A* teaching to apply to their own teaching.

Emotional factors

Emotional factors emerging from this project’s baseline data are linked to students’ learning. There was a shared concern expressed by teachers over students’ inability to present what they identified as appropriate dispositions for successful level 3 study (intellectual curiosity; perseverance; how to deal with ‘difficulty’; academic independence and self-reliance – organisation of folders; notes etc.).

Teacher learning-student learning link

Teachers identified students’ inability to move beyond GCSE knowledge and understanding to the demands of A level. However, teachers did not appear to recognise the relationship between how they teach and students’ learning both in terms of dispositions, whereby sixth form students learning habits were the product of their diet from year 7-11; and where the teaching of the processes of critical evaluation and analysis needs to be as explicit as the content of the course.

The innovation phase

What pedagogical strategies have you been trialling throughout the project?

In project 1, the pedagogical approaches were identified by the teachers themselves as areas to extend their own practice further. These included: cooperative learning; dialogic learning to improve written outcomes; and extended questioning. In project two there was a shared focus determined by the main action point for quality of teaching across the school: pace and challenge. In project 3 the overall pedagogical focus was on developing critical thinking within a subject specific context.

How this was done was interpreted and translated into practice by the teachers themselves.

What approaches to professional development have you been trialling?

An enquiry approach is a thread which ran through all three projects based on Kolb’s learning cycle (Kolb, 1978): concrete experience; reflective observation; abstract conceptualisation; active experimentation. By definition, therefore, all three projects were long term developmental programmes rather than a series of ‘one off’

workshops, offering opportunities for ‘varied, rich and sustainable’ learning opportunities (claim 5).

Projects 1 & 2 were structured around learning threes as a mechanism for **peer coaching; joint planning;** and **peer observation.**

All three projects were based on a ‘learning set’ of 10-12 participants (broken down into subsets of learning 3s for projects 1 & 2). These sets met regularly throughout their programmes as a further form of collaboration, sharing of ideas and feedback. Each learning set was run by a school practitioner, not external facilitators, who had established expertise in the fields of teaching and learning programmes; critical thinking; and deliberative practice. Facilitators also had a deep understanding of the contexts in which participants were working.

Peer **coaching** featured in all of the projects. In projects 2 & 3 coach training was included as part of the programme and was then put into practice within the context of the rest of the teaching & learning programme. The aim was to develop the capacity of the participants not only to develop their own practice but also to support the professional learning of other colleagues, thus building the capacity for sustainable change and placing the agency of professional learning firmly with the teachers themselves. All those engaged in ‘deliberative practice’ had already been coach trained.

Deliberative practice ran as ‘dual level enquiry’: teachers adopted an enquiry approach to develop a specific aspect of their teaching; they also served as participants enquiring into deliberative practice as an effective form of professional learning.

How did you maintain and build the momentum and collaborative dimension of your work?

Establishing and maintaining successful collaboration within and across schools was facilitated by several factors:

- each project focussed on an area that participants acknowledged as **relevant** to their own professional context
- the commitment by the leadership of respective schools to release teachers for the projects and to support the in-school work that resulted
- building on previous histories of collaborative work between schools and / or the culture of collaborative practice within the school

- the facilitative nature of the workshops, rather than ‘instructional’, whereby all contributed to the collective learning of the group
- clear communication of expectations; timelines; inter-sessional tasks etc.

The impact phase

Project 1

A key theme arising from teacher interviews and questionnaires throughout the project was the value of collaboration. This was seen by teachers as highly practical in terms of generating new ideas and helpful feedback which would have direct application in the classroom. In addition it also appeared to have a significant impact in affective terms. References were made to the ‘inspirational’ nature of working with others which ‘creates and sustains energy and enthusiasm’, particularly valued in the pressurised climate of everyday teaching. It would appear, therefore, that the group were successful in generating the emotionally safe and supportive culture identified in the baseline data and referred to in claim 7.

A second theme, linked to claim 2 and the importance of challenging thinking, was that of enhanced confidence teachers had in their own powers of reflection and analysis. This was very much a result of the opportunity the project offered teachers to have time to ‘stop and think’ both in their learning threes, and as a learning set when they met together.

An unintended outcome which resulted from the project was a realisation of the value of involving students more explicitly in the process of discussing teaching, which had a positive impact on students’ exploration of their own learning. As a result, teachers did not only foster greater intellectual engagement by their students as a result of the strategy that was the focus of the deliberative practice, but also by talking to students about what they were doing and why.

A restraining factor that affected teachers’ implementation of their chosen strategy was that of the pressure of the run up to exams.

From late April, teachers were reluctant to continue with experimentation and returned to what they identified as ‘their comfort zone’. This appeared to illustrate what teachers see as an ongoing tension between high stakes accountability and authentic professional enquiry.

Project 2

Summer 2013: EP mathematics 60 per cent (+3 per cent); EP English 63 per cent (+25 per cent)

Summer 2014[3]: EP mathematics (56 per cent) (-1 per cent from baseline); EP English 57 per cent (+ 19 per cent from baseline)

Evidence generated by observation and feedback from the teaching and learning programme; school monitoring data; school systems now in place identify the following as important areas of impact on staff and the leadership of learning across the school.

Enhanced professional confidence in themselves as teachers as a result of being able to use the teaching and learning programme to 'slow down' their teaching, dissect it and make explicit the skills, knowledge and understanding they bring to the teaching of their lessons.

This also enabled teachers to develop their ability to be constructively critical and evaluative, identifying for themselves the one single 'even better if' to improve the quality of learning in a specific context. As a result, it appears that these particular findings also serve to reinforce claim 2 in terms of challenging thinking as a part of changing practice.

Furthermore, the tight focus of the teaching and learning sessions on **one specific element of teaching** - 'pace' and its constituent parts - meant that there was a high degree of 'transfer' from the learning in 'the training room' to actual practice in the classroom, supported by 'learning 3' observation evidence and also school monitoring evidence.

As with project 1, teachers acknowledged the value of working in a safe, supportive group, created by the facilitator, but which also acted as a model for the wider approach to CPD across the school.

School wide impact of the project is seen through the enhanced confidence participant teachers now have in themselves to support the development of others, contributing to the increasing capacity of the school for peer coaching. As a result, the original cohort has supported a new cohort, who, in turn, now support another. Some of the original cohort is now engaged in Masters programmes. Leadership have also acquired an enhanced understanding of professional learning to improve

[3] Changes in exam system in relation to first entry rule for maths and English and loss of speaking and listening in English do not allow for a valid comparison to be made with 2012-13.

the quality of teaching which they now understand to be personalised, contextualised and developmental (as opposed to generic and instructional). This would appear to reflect the main aspects of claim 9 linked to the leadership of effective professional development.

Project 3

As with projects 1 and 2 teacher interviews revealed that teachers valued the opportunity to work collaboratively as presented through:

- observing colleagues implementing critical thinking strategies in their sixth form lessons early in the programme to act as a stimulus for their own thinking in linking 'theory' to 'practice'
- the opportunity to work regularly in small groups on inter-sessional teaching tasks sharing specific ideas and receiving challenging feedback on their critical thinking approaches
- teachers from two of the three schools participating having colleagues who had taken part in the same programme in previous years. Current participants were able to draw on their colleagues' experience and expertise within school to support their learning, thus starting to create a 'critical thinking' community

As such, these findings would support claims 2, 6 and 7.

Pedagogical understanding and developments resulting from the project which featured in self-reports through interviews, observation of materials presented in workshops, and also through subsequent observation data include the following:

First, there was an understanding that teaching for such high level outcomes at A-level was highly complex with no 'easy fixes' or 'top tips'; specific classroom strategies were developed and implemented to support students' deeper engagement with material, forcing clarification of understanding as opposed to 'impressionistic' understanding. Such strategies included – reciprocal teaching; 'close reading'; the use of Paul's *Intellectual Standards*[4] to self-assess and peer-assess written paragraphs / extended writing; the modelling of such assessment processes;

Second, there was some evidence of teachers re-organising more strategically their wider programmes of study, going beyond single lesson based strategies (teaching

[4] http://www.criticalthinking.org/pages/universal-intellectual-standards/527

through core concepts; ‘flip learning’, ‘menu approach’). For example, the use of concepts to frame teaching led to an increase in the quality of analysis and evaluation in written outcomes of students across the ability range.

By the end of the project, as indicated in interviews and observations from the training programme, teachers were able to articulate a more precise and subject specific construction of critical thinking and link it to new developments in their approach to sixth form teaching. This ‘construction’ was clearly informed by their A level exam specifications. As such, teachers were engaged in a process of interpreting and translating critical thinking for their own subject and classroom contexts. They were discerning about what they used from the critical thinking model and how. They displayed a high degree of autonomy, agency and criticality, rather than being passive recipients of a ‘set package’ of materials, illustrating the ideas presented in claim 2 on challenging thinking as part of changing practice.

Final conclusions

A synthesis of the findings across the three projects would suggest the following may contribute to great professional development that leads to great pedagogy:

- Professional learning should have a very specific and clear focus, relevant to the participants own professional context **but** recognise that outcomes will differ according to the different interpretations and translation into practice individual teachers bring.
- Professional learning should be structured in a way to support development over a period of time, allowing opportunities for reflection, experimentation, and review. This, in turn, supports sustained change in practice.
- Professional learning programmes should be based on a premise that the capacity to develop and learn is within each teacher, and the professional learning should be structured in such a way to support the development of a teacher’s intellectual and professional autonomy.
- Professional learning should allow for extensive collaborative learning which appears to support motivation, develops confidence, challenges thinking, and deepens understanding, all contributing to improved practice in the classroom.

References

Stoll, L, Harris, A. and Handscomb, G. (2012) *Great professional development which leads to consistently great pedagogy: nine claims from research*. Nottingham: NCSL

The Compton-Barnet Teaching School Alliance

Alliance name	The Compton-Barnet TSA
Alliance context	19 schools, 1 HEI and 1 local authority. Typical profile of an outer London borough. Broad social-economic context ranging from one school with 67 per cent FSM and another school with 5 per cent. 1 school in requires improvement category, 6 schools designated as good, 12 as outstanding.
Schools involved in the R&D project	The Compton School as lead school (secondary), Hendon School (secondary), Oak Lodge School (special) Canons High School (secondary), Park High School (secondary) Stag Lane School (primary)
Research focus	Teacher collaboration, shared observation and structured, developmental feedback sits at the heart of great professional development and provides the experiential learning necessary to support effective pedagogy.
Research question(s)	• To what extent are collaboration, observation and feedback effective forms of CPD which lead to effective pedagogy? • How do collaboration, observation and feedback support the development of great pedagogy?

The implementation phase

The original dynamic of the project was based on the teaching school's commitment to developing partnership working and strengthening collaboration across its alliance through a joint research project. One of the aims of the project was to explore the balance between prescription and autonomy in managing newly developing alliance relationships in the context of delivering specific learning outcomes for staff and pupils.

To this end Hendon and Harrow schools were identified as key partners as the respective senior leaders within their schools had research experience and were highly committed to developing professional development within and across schools. A number of preliminary meetings were set up to draw in a wide range of partners, but these were poorly attended. Momentum for the project was gained by using targeted funding to secure a small bursary for participating staff in order to secure engagement and delivery.

The focus of the project converged around two sets of experiences. On a practical level, Hendon School had implemented an internal 'triads' project with a number of staff engaged in cross–curricular observations and feedback. Senior staff at Canons High School and The Compton School were very interested in the concept of JPD and had attended various workshops run by Professor David Hargreaves.

To this extent, the initial thinking behind the project was very much influenced by claims 6-9, with claim 4 being the most central proposition.

Two sets of professional development triads were set up within Barnet and Harrow involving 12 staff. Staff were allocated to an individual triad in terms of subject background or interest. Each triad then identified their own specific area of interest with a focus based on outcomes for pupils. These outcomes were linked to:

- improving pupil engagement
- developing pupil self-assessment
- developing greater challenge for the more able
- promoting deep learning

At the innovation stage the intended outcomes for staff were predominantly linked to a desire to improve classroom practice; and an opportunity to develop professionally by working with colleagues beyond own school.

At this stage, the main focus was to ensure that project participants had a clear rationale for their research and a clear understanding of the level of engagement required. No baseline data was established at this stage.

The innovation phase

Having a parallel cluster project ensured momentum and increased both the distribution and collaborative dimension of the work.

However, turnover in senior staff involved in the project meant that the teaching school had to have an overall operational role in leading the project which was not originally intended. In practical terms this meant focusing on the Barnet triads.

Pedagogical strategies trialled throughout the project included:

- Small scale, high leverage but maximum impact techniques that can make a difference in any context. For example: use of lollypop sticks for student feedback / matching important words to definitions / quiz based memory games linked to topic/ greater use of paired discussions and ‘speed dating’ / innovative resource design to prompt and structure discussion; use of a simple tally system based on seating plan to monitor and assess pupil participation

- A more explicit focus on experiential learning / encouraging students to explain their learning orally or in written form / more tightly focused methods of self-evaluation / reflections on progress. For example, ‘chains of knowledge’ - paper chains of coloured paper used by pupils to demonstrate what they had learnt over the course of a lesson; use of ‘I can…’ sentences / ‘I need some help sentences’ where students decide how confident they are that they can (or cannot) do a particular task.

Approaches to professional development trialled included:

- Establishing a clear triads framework: pre-meeting to share lesson objectives and discuss learning strategies; peer observation and feedback linked to the pedagogical focus.

- Following a peer observation, other teachers to use at least one strategy from the lesson observed and incorporated into each lesson / next lesson to be observed by partners.

- Before, during and after monitoring of pupils’ work to identify and evaluate any improved outcomes in our focus area.

- Individual case studies written by all triad members with a focus on impact of implemented strategies on pupils.

- The underlying approach to professional development within the triad model was very much linked to teachers taking control of their learning; having the time and opportunity to evaluate the needs of their pupils; gaining constructive feedback from peers without an agenda imposed ‘from above’ / by Ofsted (although significantly, one triad focused on student progress as they wanted an area within the Ofsted framework).

The impact phase

Evidence of impact on teachers has come through case studies written by individual members of the triads and peer observation based on the pedagogical focus of each triad group; structured questionnaires – completed by individuals and as triad - also provided evidence of impact. Areas of impact for teachers included:

- provision of new ideas… giving me the confidence to try new techniques in my teaching
- being given the space to reflect on our practice and return to pedagogy has been greatly empowering. This is a non-threatening system that allows observations to take place with an emphasis on experimentation, not judgement

Areas of impact for learners included:

- Use of chains of knowledge to provide a platform for students to show progression honestly and accurately in relation to specific subject skills / knowledge.
- Use of 'I can now do'… 'I need some help' cards ensured that pupils across the ability range were able to express their views on progress in their learning.
- Use of a greater range of AfL techniques and having a simple tally chart based on class seating plan ensured a greater number of students actively engaged and participated in lessons.

In terms of impact on our school / other schools:

- Whilst working across schools can be problematic, participants felt that working this way – within a relatively limited timeframe and with clear guidance – created a sense of moral obligation to others and enhanced commitment ("did not want to let others down... easier to make excuses in own school when you know the people").
- Having an experienced deputy head leading the parallel project in Harrow – and involved in discussions around setting up the project – also ensured that teaching partners initially had a clear sense of ownership of the project alongside expectations of project outcomes. However, changes in staffing made it very difficult to review and evaluate the impact of the project beyond the three Barnet schools.

From the above, it is clear that the experiences of participants most strongly support claim 7 in terms of effective professional development. The following quote is illustrative:

> Being given the space to reflect on our practice and return to pedagogy has been greatly empowering. This is a non-threatening system that allows observations to take place with an emphasis on experimentation, not judgement.

Final conclusions

Following the work of Hargreaves on JPD (2011, 2012), we have found the following actions support a highly effective model of professional development in terms of teacher motivation, confidence, and willingness to take risks, experiment and innovate:

- Peer-to-peer collaboration rooted in parallel clusters of practitioners (triads) with a shared commitment to improve a mutually agreed area of classroom practice.
- Bottom-up collaboration with teachers identifying and invested in an aspect of practice meaningful to them – the teachers in the project really valued the opportunity to determine and shape their own learning.
- A designated co-ordinator to ensure participants fully understand their role within the collaboration and their responsibility for achieving specified outcomes.

We would not make any claims that this model consistently leads to great pedagogy since evidence for this has not been validated over time or through school based observations from teachers outside of the project. Moreover, the participants themselves would not necessarily assign the description ‘great pedagogy’ as an outcome of the JPD. However, all reported an improved sense of confidence in trying out new pedagogic practices and recognition that great teaching required great planning, great feedback and a willingness to act and revisit the feedback provided.

What have you found out about how to engage in collaborative R&D?

- The co-ordinator needs to be able monitor and set direction and, crucially, ensure a culture of risk and experimentation with an acceptance of metaphorical false dawns and cul-de-sacs ie the need to accept that avenues may be explored that are not productive and that changes in direction will be

inevitable and so working in this way requires flexibility and adaptability from everyone involved.

- Structured time must be set aside to facilitate joint planning and ensure a learning dialogue in place linked to:
    - Developing practices and planning strategies to address their specific areas of interest within the context of each other's lessons.
    - How changes in practice will be will be assessed within a cycle of classroom observation and feedback (teachers A and B observe C, teachers C and B observe A etc).
    - Making use of existing research as a starting point for a review of practice and potential next steps needed to improve practice.
- Whilst teachers decide upon an area practice relevant to them, the focus for improvement takes place within a tight framework - setting out the intended outcomes of the collaboration and ensuring participants are clear about how they record the activities and strategies undertaken to achieve their specified outcomes.
- Within the context of a tight organisational framework, the focus of the R&D collaboration needs to be teacher driven by a shared commitment to improvement. Effective collaborative R&D cannot be imposed by management. Moreover, if driven by Ofsted or SIP imperatives, **collaboration will lose its main driving force: teacher willingness to share ideas and try out and evaluate the impact of new practices.**
- Collaborative R&D can work very effectively cross phase and across curriculum areas, providing that the participants have a clear generic teaching and learning focus that is transferrable to their respective classrooms.
- Crucially, collaborative R&D is not for all schools and needs to be attuned to the life cycle or journey of a school. Schools and participants must be secure and confident in what they do and embrace collaboration as an approach to making marginal aggregated improvement gains to existing high quality performance. This is especially true when collaborative R&D takes place across schools.
- Effective collaborative R&D needs to have clear reporting mechanisms to keep participants sharp and focused on their specified areas of interest. In our case this was regular half termly feedback meetings, a pro forma to record individual and group reflections, the writing of a case study based on

individual pupils within a teaching group, at least one peer observation from someone not in the cluster and a triad devised presentation to senior staff within our TSA.

- Collaborative R&D across schools works best within a close geographical area where existing relationships ('social capital') are strong and effective mechanisms for review and evaluation can be smoothly operationalised.

What have you learnt about the nature of collaborative enquiry that brings about improvement for pupils?

From the outset participants in the project – whilst recognising the need to develop forms of evidence showing improved outcomes for pupils – strongly rejected the idea that the limited lifetime of the project would meaningfully correlate with a significant improvement in pupil learning as measured by levels/grades. However, by using a case study approach of individual pupils, observation and feedback from teachers outside the project and pupil interviews, participants were able to identify how their focus led to improvements for pupils. For example:

- Chains of knowledge provided a platform for pupils to show progression honestly and accurately in relation to specific subject skills / knowledge.

- Use of "I can now do"… "I need some help" cards ensured that pupils across the ability range were able to express their views on progress in their learning.

- Use of a greater range of AFL techniques and having a simple tally chart based on class seating plan ensured a greater number of students actively engaged and participation in lessons.

How will we ensure learning is shared and sustained going forward?

- The triads model has demonstrated the effectiveness of teacher led, classroom based JPD. In our own school this resulted in structured time being provided in the spring and summer terms of 2014 for staff to work in pairs or trios on an area of classroom practice. Participants from the triads project will lead a staff CPD session as an introduction to using research and working collaboratively to improve classroom practice.

- As a teaching school we are working with 10 of our partner schools on a literacy project as part of the London school excellence fund. At the core of our project is a commitment to cross-phase JPD within three partnership clusters of three or four schools. The focus of this will be staff joint planning, observing and reviewing lessons focused on improving literacy and pupil

attainment for level 5-6 pupils in year 6 primary and level 3-4 pupils in year 7 secondary.

- As part of our learning from our collaborative R&D project, we will look to use the work of Pete Dudley[5] *Lesson Study: a handbook* (2014) Cambridge) within the clusters as a more systematic approach to research lessons that are jointly planned, taught / observed and analysed by participants.

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Torbay Teaching School Alliance

Alliance name	Torbay TSA
Alliance context	Torbay TSA is a network of schools comprising 30 primary schools and three secondary schools from across Torbay local authority. As part of the alliance, a range of teaching and learning networks have been established, one of which focuses on developing mathematics across the alliance. This network has an ethos of collaborative working, with a focus on schools supporting schools. All members of the network's steering group (nine schools) were invited to join in this research project, with six taking up the invitation.
Schools involved in the R&D project	Oldway Primary School (lead) Ellacombe Academy Ilsham Church of England (CE) Academy Roselands Primary School St Marychurch Primary School Torre CE Academy
Research focus	To assess the effectiveness of the lesson study process in improving the teaching of calculation in years 3 and 4, improving pupils' arithmetic proficiency.
Research question(s)	What aspects of lesson study impact most on how teachers' improve pupils' arithmetic proficiency in years 3 and 4?

The implementation phase

Before this project, Torbay TSA had been interested in promoting a school-based enquiry approach to improving the teaching and learning of mathematics across the alliance and this project seemed an ideal opportunity to explore lesson study as a tool to facilitate this approach.

Within the alliance, we have an established mathematics network, which has an ethos of collaborative working, with a focus on schools supporting schools. We hoped that this project would give participating schools a framework in which to engage meaningfully in school-based enquiry within their schools, with teachers having a clear understanding of how to use enquiry effectively to improve the teaching and learning of mathematics in their classrooms. Ultimately, we were hoping that this practice could then be disseminated to strengthen the use of effective research across the alliance.

All members of the network's steering group (nine schools) were invited to join in this research project, with six taking up the invitation. Looking back, the fact that this research took place within an existing network meant that we could get into the actual research much more quickly as protocols for collaboration were already established. However, the importance of having explicit expectations and deadlines in place became essential as day-to-day school life had a habit of taking over (even working with carefully chosen partners who have 'bought in' to the project). One significant factor to ensuring that the project remained a high focus for the schools involved was ensuring that headteachers were committed, informed and updated on progress – we did this initially through the project lead and then through subject leaders.

We decided that the mathematics subject leaders would lead the research within their own schools, feeding back half termly. We quickly agreed that lesson study would be our professional development focus and decided to have a common mathematical focus for the lesson study itself, as ultimately it was impact on pupil performance that we wanted to drive our research.

As mathematics subject leaders, we felt that 'calculation' was an area of relative weakness across the alliance. We were aware of England's apparent poor performance in international comparison tests and had been interested in some of the different ways of teaching calculation in countries that are high performing in programme for international student assessment (PISA) tests. It emerged that a possible difference was in the use (or lack of use) of manipulatives to support deep learning of the underlying structure of each operation, with conceptual understanding and fluency being taught hand in hand.

With this in mind, we decided that the focus of our research would be: what aspects of lesson study impact most on how teachers' improve pupils' arithmetic proficiency in years 3 and 4?

The innovation phase

Throughout the project it has been important to keep this double focus of lesson study and arithmetic proficiency in mind, as we wanted to ensure that we were able to measure the impact of the project both on teacher and pupil learning. This meant being clear about our intended outcomes from the start:

- professional development i.e. teachers would be confident to use school-based enquiry as a professional learning tool.
- Pedagogical development i.e. staff would have a greater understanding of successful approaches to teaching calculation with understanding – improving the teaching of calculation in years 3 and 4.
- Improvement in attainment i.e. pupils would calculate efficiently in each operation – moving towards the use of the standard algorithm with understanding.

The majority of teachers involved in the project had undertaken some form of enquiry and felt positive about this as a professional learning tool. We were hoping that a focus on lesson study would bring some rigor to this process to ensure a more sustained improvement in practice. Before beginning our research, it was important to spend time as a group developing a shared understanding of both ‘lesson study’ and ‘arithmetic proficiency’.

We decided that the lesson study cycle we would use was as follows:

- researching teachers meet to decide a clear research focus
- teachers work together to plan the research lesson to address issues identified
- one teacher teaches the research lesson, while others observe. Each observing teacher would focus on an individual within a group, with the aim of observing and asking questions to unpick the pupil’s understanding and how the planned teaching impacted on the learning – identifying breakthroughs and barriers
- teachers meet together to evaluate the research lesson, share observations and begin to formulate hypotheses. It is at this point teachers were encouraged to test these out against published research
- teachers re-plan and re-teach the lesson (as above)
- teachers meet again to evaluate the whole cycle and draw together findings.

As there was some concern about the cost of completing each cycle, we decided that we would stick to a rigid structure for the first cycle and give schools freedom to adapt the process in the second and third cycles. We also agreed that our definition for arithmetic proficiency would be ‘the development of conceptual understanding and procedural fluency in tandem’.

Before the first cycle, we carried out a range of baseline assessments including a teachers’ perception questionnaire and a pupil calculation assessment. The teachers’ questionnaires seemed to highlight the fact that many teachers in years 3 and 4 see their job as helping pupils to calculate with increased fluency in a range of contexts but not necessarily to develop pupils’ conceptual understanding of either the number system or the calculation operations. It was all about ‘doing’ more and more complex calculations accurately. These surveys also highlighted teachers’ lack of confidence in teaching subtraction and division. The calculation assessments seemed to show that pupils had an immature sense of number and also that pupils were often trying to apply a learned procedure (often unsuccessfully) and were particularly unsuccessful in subtraction and division.

Schools then completed at least two lesson study cycles over an 18-month period, with teachers using learning journals to capture learning and subject leaders meeting regularly to draw together findings across the alliance. As subject leaders, we very quickly had anecdotal evidence that this research was making a real difference to both pupils and teachers (such as informal discussion between colleagues, an increased use of manipulatives evident in planning, informal work sampling) and spent some time deciding on consistent approaches across the six schools to capture this evidence more formally.

The impact phase

The first set of data we wanted to collect referred to teacher learning. Through informal feedback from subject leaders, we knew teachers felt that lesson study was effective – teachers were approaching the subject leaders asking for appropriate published research and requesting budgets to be spent on manipulatives to support learning - but we wanted to know why. After the first lesson study cycle, we conducted semi-structured interviews to try to unpick how being involved in lesson study had impacted on teachers understanding / confidence. We also asked teachers to complete questionnaires following the second cycle to capture changes in practice.

These, along with a second calculation assessment and work sampling by the subject leader in each school also gave us information about the impact of our project on pupil learning. These were some of our observations:

- Following the research every teacher involved is using manipulatives routinely to support the learning of all pupils and the majority feel able to introduce the standard algorithm with understanding earlier – this marks a significant shift in practice as before the project these resources were used solely to support less-able pupils in the majority of classrooms. Typical responses were:

  > Before working on this lesson study project, I would have left teaching division until the summer term… now I am much more confident about how to support pupils' understanding so that they aren't just learning a method. I have been really surprised by the difference this makes.
  >
  > I would never have thought that children in this age group could tackle the standard algorithm for division… the use of the place value counters reinforced their understanding so it has definitely been worthwhile.

- Teachers reported that this increased use of manipulatives seems to give pupils a framework to articulate their thinking, moving the dialogue between pupil and teacher away from the procedural and more towards the structure of the calculation. Pupils' work also shows a deeper understanding of the operations used.

- It also seems that lesson study is successful in bringing about a sustained change in practice as it changes the way teachers think about teaching and learning. In four of the six schools, teachers commented on a change of mindset, with a typical responses to the questionnaire being:

  > Lesson study changes the way you think about the learning that is taking place… we discovered that we can make learning a lot easier for pupils to grasp by introducing place value counters and using them alongside the written calculation so that each step makes sense.
  >
  > The thing with lesson study is that it changes your planning and it will never go back because your thinking has changed.

- When exploring which aspects of lesson study are the most valuable, teachers unanimously agreed that where possible the whole lesson study structure should be used as each part is as valuable as the next and it is the whole structure that seems to allow teachers to shift their focus from teaching to learning and, through working together to observe and evaluate learning, discover new insights into teaching and learning in mathematics.

Final conclusions

As we come to the end of the project, it is clear that these six schools are committed to the use of lesson study as a structure to support an enquiry approach to professional learning. Our plan moving forwards is for each of the subject leaders involved to lead a small lesson study project with a new group of schools within the alliance, focusing on an area of mathematics relevant to this new group.

In summary, it seems that our research clearly links to the nine claims for effective professional development:

- It has been a theme of our research that teachers feel lesson study is effective because it changes their thinking – there are many examples of teachers recognising that standard algorithms can be introduced earlier than previously believed and teachers feel much more confident with the demands of the new national curriculum, (claim 2).

- A feature of lesson study is that it is rooted in the classroom and starts from an issue that is relevant to the teachers and pupils who are involved. However, I don't believe we would have learned as much had it not been influenced by input from NCETM and evidence from practice in high performing jurisdictions worldwide. Our thinking was particularly challenged by the introduction of place value counters following training by NCETM (claim 3).

- Teachers certainly value the collaborative nature of learning in lesson study with one colleague stating: "the power of lesson study is collaborating with colleagues to delve deeper into the learning that takes place in a particular area of maths." and another stating: "the power of lesson study is colleagues working together to find a shared understanding of the learning and possible misconceptions within a key concept in maths." Collaboration is critical in lesson study – it is through working together to observe learning that real breakthroughs in understanding take place (claim 7).

- Over the course of the project, the role of the subject leader within each school has been crucial to probe thinking and offer expertise, introducing useful reading/current national thinking. However, the timing of this intervention is important as it is critical that the teachers involved have real ownership of their learning and do not rely on the expertise of the subject leader to provide answers (claim 9).

Finally, being a facilitator of this project has been both challenging and rewarding. At first it seemed to take a long time to 'get going' but on reflection the groundwork put

in at the outset was essential to ensure each school felt ownership of its own learning and empowered to make changes (within a framework) to respond to the particular needs of their school. Having clear agreed expectations and timescales helped the project to maintain momentum with subject leaders driving the work in their own schools. This distributed leadership of the project ensured that the whole project didn't hang on the capacity of one individual to actively engage week by week. Working in this collaborative way has been invaluable as teachers and subject leaders have had the opportunity to test out learning with colleagues and has led to a deeper understanding of how to teach calculation with understanding. This work been pivotal in the work by mathematics subject leaders in our TSA to create a model calculation policy outlining a clear progression in the teaching of each operation with links to vocabulary, concepts and models and images.

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