Evaluation of Maximising Pupil Progress

On behalf of the National Strategies

centre for science education

Centre for Education and Inclusion Research

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SHARPENS YOUR THINKING

Contents

Summary findings

Maximising Pupil Progress is an effective programme with clear rationale and underpinning pedagogy and wealth of quality intervention strategies and resources.

The models of implementation within local authorities generally followed a similar approach but with local variation to suit needs. Schools appreciated the high level of support provided by both network and in-school activity and the role of the consultant contributed to the effectiveness of the programme.

Identification of barriers to progress and strategies to overcome these were central to the programme. Evidence of increased awareness of barriers, use of a greater range teaching strategies to address barriers and greater appreciation of pupil progress (by both teachers and pupils) illustrates successful outcomes of the programme.

Evidence from this evaluation study illustrates the benefits of the intensive support programme offered to schools. This support was provided by a combination of offsite training and networking, consultancy and in-school support from consultants. Schools were offered a high level of input from their local authority (4-6 days per year) on this project, creating a high profile and critical mass of input contributing to affecting change in teaching strategies and subsequent improved outcomes for pupils.

The key impacts found were:

1. **On teaching strategies and approaches used by science staff :**

    - greater confidence in teaching specific skills across areas of 'How science works'
    - use of a broader range of teaching strategies
    - greater reflection on practice
    - improved practice in a range of pedagogical approaches
    - more effective sharing of good practice

2. **On pupils' confidence and generalisation of learning skills including ability to make connections between their learning in one focus of the project to new contexts:**

    - developing of general learning skills such as study skills, group working, understanding key terms used in questioning

- understanding and applying transferability of 'How science works' skills across different contexts e.g. in relation to drawing graphs

3. **On pupils' interest and engagement in science:**

- much greater engagement with, and interest in science, associated with more learner-focussed and learner-led activity

4. **On pupils' attainment and progress:**

- pupils understood how to make better progress through key stage 3 & 4 because teachers were able identify pupils' weaknesses using effective formative assessment

The factors associated with successful outcomes of the programme can be summarised as:

At programme level:

- launch event to signal the high priority of the project
- high quality and extensive range of materials
- the range of pedagogic approaches supported

At local authority level:

- providing a variety of modes of support appropriate to the needs of schools
- building on previous related work, where possible
- carefully matching LA focus to school focuses, ideally involving joint choice of focus
- providing cross-school networks

At school level:

- careful selection of the lead teacher
- engagement and capability of other teachers
- pupil selection
- close match between school aims and programme aims
- senior leader support

At classroom level:

- enthusiasm and skill of lead teacher
- fitting resources to teacher strengths

Learning Points

Highlighted throughout the evaluation report are ***Learning Points*** which encapsulate the key messages of the project and provide useful signals for further work. These are:

1. Building on prior work is useful. In two local authorities, the MPP project clearly related to previous LA projects
2. Careful selection of the lead teacher is important: enthusiasm and commitment to the project may be at least as important as seniority. However, some influence is needed for sustainability.
3. Schools need to be able to see a close match both with a programme's *aims* (in this case improving progression to L6 and above) and school aims, and the *focus* chosen by the local authority. Some local authorities (e.g. C3, C4) worked with schools on the focus, ensuring a close fit.
4. Using an event to launch a project is very important in giving it status and profile, and sets the tone for the rest of the project.
5. Local authorities used a variety of models to support schools both off-site and in-school. Encouraging cross-school support via networking or 'buddying' was particularly valuable.
6. Whole class strategies were seen to be the most effective and manageable approach to take, sometimes accompanied with in-class targeted group support.
7. Encouraging using materials to fit the teacher's style and pupil needs maximises their usefulness
8. Some aspects of MPP - such as use of language, study skills, understanding levels and - most clearly - group work were more suited to use beyond the MPP work and into other aspects of science and into other subjects.
9. MPP activities – delivered by skilled, motivated practitioners - clearly facilitated greater engagement with science

About the programme

Maximising Pupil Progress (MPP) is a National Strategies programme designed to address government priorities established in the Science and Innovation Investment Framework 2004-2014 to improve STEM skills and to 'grow' more scientists in the UK. The programme aimed to increase the number of pupils achieving level 6 at the end of Key Stage 3 and consequently improve the proportion of pupils achieving A*-B grades in two science GCSE s. The long-term, overall effect of this intervention would be to increase the number of pupils opting to study science at post-16.

The project was launched in March 2007 and will continue for four phases until March 2011.

Phase I	2007/8	trials- original title 'Level 6 and beyond'
Phase II	2008/9	national launch of programme, CD ROM made available to all schools in 'Developing Future Scientists' pack
Phase III	2009/10	eligibility of schools widened – renamed Maximising Pupil Progress
Phase IV	2010/11	extended for schools and LAs previously participating in MPP, minimum of six schools per LA

The project is data driven; schools were selected for inclusion in the project because they were below the national average for conversion between key stage 2 - 3 (level 4/5 to 6+) and key stage 3 -4 (level 6/7 to at least grade B GCSE). Varying numbers of schools were eligible in each LA, but LAs were only included if they had more than 6 eligible schools though some LAs worked as consortia so they had enough eligible schools.

The programme has involved 110 LAs in England (72%) for at least one year and approximately 15% of English secondary schools.

Content of the programme

The project identified areas within science which created barriers to learning for some pupils and subsequently became a barrier or blocker to further progress beyond level 6.

Identified barriers to pupil progress
▪ How science works
▪ Group talk
▪ Research skills
▪ Scientific writing
▪ Using models
▪ Understanding misconceptions

To overcome these barriers a comprehensive range of teaching resources, effective classroom strategies, guidance and interventions were developed and used by LAs and schools.

In addition to teaching materials the issue of progression in each defined blocker area was addressed by the development of 'Steps Tables' for teachers. These identified steps in progress and strategies to support progression from one step to the next.

Scope of study

This study investigated the impacts on teachers, pupils and schools of the **Maximising Pupil Progress (MPP)** programme. It is important to note at the outset that it did not aim to investigate improvements in external attainment and teacher assessment, since this analysis has been conducted separately by the National Strategies. The focus of the study was to investigate in detail the learning and, importantly, key factors associated with positive outcomes of the programme. The primary research question of the project was:

What are the key strategies and approaches of the MPP project that have impacted most on teacher practice and pupils' progress in the schools taking part?

The key **dimensions of impact** the research team were asked to consider were:

1. Impact on teaching strategies and approaches used by science staff
2. Impact on pupils' confidence and generalisation of learning skills including ability to make connections between their learning in one focus of the project to new contexts
3. Impact on pupils interest and engagement in science
4. Impact on pupils' progress through teacher assessment

The study involved detailed case study work with five local authorities selected by the National Strategies. Sources of information used in the study include:

- evaluation data from LA consultant interim reports (March 2010)
- evaluation data from LA consultant final reports (September 2010)
- interviews with LA consultants (4 conducted by telephone, 1 face-to-face)
- school visits: interviews with teachers and pupils

The schools were a diverse group, including 11-16 and 11-18 schools of various sizes and in differing circumstances from very small to larger than average in towns and cities throughout England.

Context

Table 1 shows the interviews conducted for this study.

LA	School	LA consultant	Teacher(s)	Pupils
C1: Oldham	**North Chadderton**	Minority ethnic achievement consultant	Lead teacher MPP; KS3 science coordinator; Science subject leader	5 Y10 pupils: 2 boys, 3 girls
C2: Lancashire	**Our Lady Queen of Peace**	Science Consultant	Science subject leader; Assistant science subject leader	6 Y10 pupils: 4 boys, 2 girls
C3: Devon	**St Luke's Sports College**	Science Adviser	Lead teacher (MPP)	5 Y9/Y10 pupils: 3 boys, 2 girls
C4: Hillingdon	**Rosedale**	Science Consultant	Teacher coordinator/LA lead teacher; LA lead teacher	5 Y10 pupils: 4 boys, 1 girl
C5: Calderdale	**Ryburn Valley**	Science consultant	Teacher *see footnote*[1]	

Table 1: Summary of interviewees

[1] interviews were conducted via telephone due to unforeseen circumstances with school and teaching staff

Table 2 below indicates the range of contexts.

	Context	Relevant prior work
C1	Larger than average 11-18 school in large northern town. The proportion of students eligible for free school meals is below average. The proportion from minority ethnic groups has increased in recent years and is average. The proportion with special educational needs and/or disabilities is below average. Business and Enterprise specialism. Most recent Ofsted inspection (May 2010) - overall grade 3 (satisfactory) noting *"Early GCSE results for 2010 in science … show significant improvement in the core subjects compared with the previous year."*	existing LA strategic approach to developing academic writing (and group talk) through the core subjects
C2	Smaller than average 11-16 school in small northern town. The pupils are almost all of White British origin. The community has significant pockets of disadvantage and this is reflected in the above average proportion of pupils entitled to free school meals. The percentage of pupils with learning difficulties and/or disabilities is slightly above that found nationally. Engineering specialism. Most recent Ofsted inspection (Feb 2008) - overall grade 3 (satisfactory) noting *"In 2007 the results in the national tests at the end of Key Stage 3 were higher in mathematics and science than in English. The proportions of pupils gaining the expected level in mathematics and science were just below the national average"*	similar LA-run programme to MPP run aimed at KS3 pupils 'stuck at L4'
C3	Average-sized 11-16 school in south west city. Most students are of White British origin. The proportion of students eligible for free school meals is slightly above the national average. The proportion with special educational needs and/or disabilities is above average. The school has held sports and science specialist status since 2005. Most recent Ofsted inspection (October 2010) - overall grade 2 (good) noting *"The sports and science specialism makes an outstanding contribution to students' achievement, career development and enjoyment of school life."*	none mentioned

	Context	Relevant prior work
C4	Very small 11-18 school in London. The student population is very ethnically diverse and almost 80% of students speak English as an additional language. The proportion of students known to be eligible for free school meals is well above the national average. A large number of students join or leave the college at different times during the academic year. Recently became the lead partner in a hard governance federation with another local secondary school. Most recent Ofsted inspection (April 2010) - overall grade 1 (outstanding) noting *"The outstanding curriculum is innovative in its design and is a significant contributor to the exceptional progress that students make… "*	none mentioned
C5	Larger than average size school in northern town which has grown in size over recent years and is heavily oversubscribed. The proportions of students eligible for free school meals, from ethnic minority groups and with special educational needs and/or disabilities are all below average. Awarded specialist status as a Media Arts College in 2004. Most recent Ofsted inspection (Nov. 2008) - overall grade 2 (good) noting *"The specialist Media Arts College status has played a significant part in developing the school's provision. The school has successfully collaborated with a wide range of organisations."* School interviews not conducted due to bereavement in school MPP lead's family and cancellation due to weather.	none mentioned

Table 2: Range of contexts

The programme

Involvement in MPP

There were clear similarities and significant differences between the approaches of local authority to involvement and implementation of the MPP programme.

Similarities in approach stem from the national organisation and infrastructure of the National Strategies programme. Most of the LA consultants interviewed attended briefing and training sessions held nationally each year.

Differences in delivery and implementation reflect local needs and previous LA initiatives. Local variation is illustrated by the terminology and descriptors adapted by LAs for the programme. Two of the five LAs visited renamed the project to fit with existing or previous work on progression in their authority.

Learning point 1:
Building on prior work is useful. In two local authorities, the MPP project clearly related to previous LA projects

Selection of schools and teachers

During the lifetime of the project there has been a gradual shift from centralised identification and section of schools for the programme to a more self-selecting process; this is in line with a change in eligibility criteria in the latter phases of the programme resulting in a widening of schools participating in the project. Responsibility for and interaction with attainment/conversion data has moved towards the schools during the programme. One local authority reported providing training for schools at the network meeting to analyse school and pupil performance data.

In the majority of cases schools were invited by the local authority to participate in the programme. Selection of teachers to lead the project within schools followed a typical pattern of communication and delegation within the department with initial contact through the subject leader who then identified and selected a teacher to lead the programme. In some cases this second stage selection was made by the local authority consultant.

The profile of the teachers involved in the programme varied from school to school but similarities were noted and were a factor in the successful implementation of the programme. A local authority consultant noted that schools tended to move from involving a senior leader in the early phases of the programme to engaging 'younger, enthusiastic teachers' in later phases of the programme. This was seen to make a positive difference to the quality of project outcomes.

Learning point 2:

Careful selection of the lead teacher is important: enthusiasm and commitment to the project may be at least as important as seniority. However, some influence is needed for sustainability.

Aims of MPP

In summary, the aims of the MPP in each school and local authority were as follows:

	LA view of aims and focus	School focus	Project fit with school
C1	MPP aims to "accelerate pupil progress and develop teacher skills". Local authority focus on writing and group talk.	School saw MPP fitting with wider school aims of raising pupil progress, and specifically developing language of scientific explanation.	Close fit with both aim and focus
C2	MPP aims to "get more pupils to L6 and L7 at KS3, leading to post-16 progression". Local authority focus in order on group work, HSW and literacy.	Overall aim fitted school aims, and group work was a good fit. Other focuses still successful, but the greatest change in practice occurred in relation to group work	Close fit with overall aim
C3	Improving Teaching and Learning by breaking down barriers to pupil progress. They used their own term for the project, to identify it as focussed on T&L.	School saw focus on higher achieving KS3 pupils as new, but fitted with underpinning philosophy around engagement and enjoyment. Teacher identified focus in school, supported by local authority.	Close fit with focus
C4	MPP aims to "improve teachers' pedagogy and repertoire [to enable] pupil progress". Local authority focus depended on school needs.	School and local authority worked together to develop focus mainly on HSW.	Close fit with both aim and focus
C5	Focus increasing pupil progress through transfer of practice by schools sharing knowledge and good practice. Transfer of effective practice, building capacity in schools. Shift of focus for many schools as previous interventions focused on level 5.	Improving progress from KS3 level 6 to GCSE B+ through developing greater understanding of pupil capability and expectation. Focus on HSW, particularly data analysis.	Close fit and common understanding.

Table 3: Aims and focus of the projects

Learning point 3:

Schools need to be able to see a close match both with a programme's *aims* (in this case improving progression to L6 and above) and school aims, and the *focus* chosen by the local authority. Some local authorities (e.g. C3, C4) worked with schools on the focus, ensuring a close fit.

How consultants worked with schools

Local authority consultants worked in a variety of ways with schools, starting with a launch event in each authority. This launch event was seen to be important in presenting the project and getting it off to a good start: in particular, in C3 it was viewed as vital, since a set of tasks were completed here, modelling approaches to group work, working with data, using assessment and planning the project from the schools' viewpoint.

Learning point 4:

Using an event to launch a project is very important in giving it status and profile, and sets the tone for the rest of the project.

Following the launch event, local authority consultants supported schools by providing a strategic overview, off-site professional development sessions and in-school support. A range of activities were used within each of these strands.

Providing strategic overview

This was done in all local authorities to some extent, although the strength of the lead varied. Most authorities identified key outputs in conjunction with schools and structured the project for their schools to achieve the outputs.

Off-site professional development events

Networking with other schools was a key aspect of the programme. All local authorities provided regular meetings for schools throughout the project, enabling specific training, planning, sharing of experiences and pairing of schools to be facilitated.

In-school support

Regular in-school support visits were held with all schools. Consultants adopted a variety of roles in schools including developing resources, collaboratively planning, team teaching, action planning, interviewing pupils, delivering inset to the whole department on the MPP ideas and their philosophy. The approach for each school was tailored to the needs of the schools and 'plan, teach, and review' cycle used effectively.

The main approaches taken in each method of support are detailed in Table 4 below:

	Providing strategic overview	**Off-site professional development events**	**In-school support**
C1	Local authority consultant developed the programme, selected the focus and the materials and encouraged collaboration via a coaching model.	Four days' off-site training.	Fortnightly school support visits.
C2	Local authority consultants set the focus, with schools encouraged to adapt and personalise the materials.	Five half-day networking sessions each year, to share ideas, resources and experiences. After the first year, six 'lead teachers' were selected for a 'buddying system' with schools new to MPP.	Local authority consultants took a variety of roles, including developing resources, collaboratively planning and teaching, action planning, interviewing pupils, and delivering training to the whole department.
C3	Local authority consultant orientated the project towards teaching and learning, and gave the project a localised name.	A series of network events were held.	Regular visits to school for review and team teaching activity.
C4	Local authority consultant worked with schools to develop the focus.	Off-site network meetings were held half termly, aimed at sharing resources, successes and ideas.	Local authority consultant tailored the approach to each school, including working directly with small groups of targeted pupils during science lessons.

	Providing strategic overview	Off-site professional development events	In-school support
C5	Local authority consultant worked with schools to develop their approach.	Local authority consultant worked directly with schools, typically using a series of plan, teach and review meetings with schools with follow up actions in or out of school and organising off-site meetings where necessary.	Local authority consultant used a range of strategies, including needs identification, delivery e.g. a whole day activity for pupils around gender 'working as a scientists'.

Table 4: Approaches taken by LA consultants in working with schools

Learning point 5:
Local authorities used a variety of models to support schools both off-site and in-school. Encouraging cross-school support via networking or 'buddying' was particularly valuable.

How was MPP used in the schools?

All schools used whole classes, some used full year groups, and sometimes additional support in class to key groups but targeted work with groups/individuals was not used much and where it was used (C1) it was not seen to be successful.

Learning point 6:
Whole class strategies were seen to be the most effective and manageable approach to take, sometimes accompanied with in-class targeted group support.

The starting point was the identification and targeting of underperforming pupils. This varied from school to school, but almost always included core work with a whole class. In C1, various different groups were targeted for different interventions, including use of whole year group, individuals selected on need and small groups (this was not seen to be successful). In C2 the resources were trialled by the school MPP lead teacher with his year 9 class and then rolled out to all students in the year. In C3, the focus was on one Y9 (L5/6)

class. In C4, whole class skills sessions across Y9 were used, but within that small groups were targeted for specific interventions.

MPP resources were used in schools in a range of ways, as shown in Table 5.

	How the MPP resources were used in schools
C1	Schools were given a small sample of materials which had been adapted by LA. The school took the ideas and developed a range of activities and further resources.
C2	Teachers were encouraged to adapt and personalise materials, which were evaluated by pupils and shared across the local authority.
C3	Teachers began by adapting materials, but moved towards designing own materials using ideas from the pack and fitting them with existing lessons.
C4	The lead teacher drew inspiration from the materials to develop her own.
C5	A series of 7 lessons for 'developing argument' scientific writing co-written by subject leader, 2nd in science and consultant

Table 5: How the MPP materials were used in schools

Learning point 7:

Encouraging using materials to fit the teacher's style and pupil needs maximises their usefulness

Impacts

1. Impact on teaching strategies and approaches used by science staff

Impacts identified included:

Greater teacher confidence

In C1, the LA consultant noticed *'Greater confidence in teaching academic language and embedding in science learning'* and in C3 the MPP lead teacher felt more confident in using discussion and allowing pupils to follow their own ideas. The C4 MPP lead teacher felt the teachers were now more aware of HSW science skills, which boosted their confidence in using them.

Using a broader range of teaching strategies

This was evident in all cases. In C1, the LA consultant saw *'evidence of greater range of approaches e.g. group activities'* as did the C3 consultant and teacher (within National Curriculum constraints). The C4 consultant noted that *'there were so many different styles being used'* and in C2, the LA consultant noted that:

> *'In all three areas [used in this LA], there are fundamental underlying principles of science: encouraging pupils to dialogue, to be brave and risk take and to have a greater range of pedagogies at their disposal. It wasn't just about resources, it was changing the way they thought they should teach and in the majority of cases, it did… The majority of people absolutely did change their practice.'* (C2 LA consultant)

Developing reflective practice

In C2, the LA consultant noted that involvement in MPP had made the teachers *'think about and reflect on what they were doing and 96% of people did change practice'*; the school MPP lead teacher in the C2 school added that the LA off-site training *'gets you thinking, gets you evaluating what you're doing'.* In C5, the LA consultant said he regarded progress of staff and shifts in thinking as the key outcome: '*the only way to change practice is to change thinking*.

Understanding pupil learning

In C2, the LA consultant identified that *'I think it focussed the minds of teachers about pupils' different learning styles as well'.*

Cameo 1: understanding factors relating to pupil progress

In school 5 the head of science related how understanding of barriers to learning had progressed within her department. In the early stages of the project this understanding was based on teacher knowledge and perceptions of barriers but in later stages of the programme the pupil voice was used more effectively through interviews to understand difficulties faced by pupils. Staff are much more involved in using pupil feedback of learning outcomes for planning next steps rather than assuming "*because it has been taught the pupils will have learnt it*". A culture shift has taken place in the department, *"we are less task-driven and now more learning- driven"*.

This is exemplified by planning for pupil progress rather than linking a series of curriculum focused activities together. As greater awareness of the underpinning rationale behind the programme improved the head of department introduced the use of the STEPS tables to support planning a series of lessons focusing on developing scientific writing. Following baseline assessment of pupils the tables helped identify interventions needed to develop progress in this skills area.

The approach has since been transferred to support planning for a sequence of lessons relating to developing science in the news coursework.

Improved practice

A range of examples of improved practice were noted. In C1, the LA consultant noted *'teachers using feedback to assess understanding, where previously teaching would be driven by the Programme of Study and the teacher would move on irrespective of pupils' understanding.'* In C4, the MPP lead teacher identified that the lessons plans developed were now being used by other teachers, particularly NQTs, creating *'a bit of a culture of really high-paced lessons'*. In C5, the subject leader reported that HSW outcomes were being used more explicitly, with the LA consultant noting that *'Nobody is standing still'*: progress was being made in all schools.

In C2, the school assistant head of science identified that there had been improvements in teaching related to two key areas of MPP: HSW and group work as indicated in the cameo below:

Cameo 2: impacts on practice related to key areas of MPP

The MPP lead in the C2 school noted that there had been changes in relation to HSW and group work. He felt the group work focus had the biggest impact: '*The skills that they get from group work are very important skills…. You can't teach science without doing group work…We certainly do more group work… and the way that we do it is more effective*.' The Head of Science added: *'group work – we've really developed that… We've had them working in larger groups, whereas in the past I'd never have dreamt of having them working in groups of five or six of them doing an experiment together, now they do and they all take their own roles within the teams…. No-one sits off to the side and does nothing, and they're all sharing their ideas and bouncing off each other'.* There had been a change in relation to HSW too: the school has 100 minute lessons, and now each science lesson has a HSW element to it. The lessons provided in the MPP project (e.g. water dowsing) were felt to fit very well into the school's existing KS3 schemes of work, since they didn't necessarily require prior science knowledge, but were engaging and HSW-focussed. She said: '*Some of the things we do now with our learners are more HSW-based*….'*At KS4 HSW is a big issue and… it's important that we do it at KS3*.'

Sharing practice

C1 provided some good examples of impacts on teaching and learning, and its organisation, beyond the programme, as indicated in Cameo 2 below

Cameo 3: sharing practice from the MPP programme

In C1, the teachers interviewed identified a range of ways in which MPP learning had been shared. Science teachers had delivered school inset, indicating increased confidence. There were limited opportunities to share with other heads of subject within school but the Head of Science saw potential in Maths and English. Within Science, there was evidence of strategies being used with other classes outside the target groups, particularly from teachers involved in project, and the Head of Science had noticed teachers enjoying planning lessons and sharing ideas. As part of the programme teachers were gaining new teaching skills and passing on and implementing approaches to make use of these skills. There was also some evidence of transfer of approaches and skills to other teaching groups.

In C2, the school science subject lead noted that '*'I think it's been really good. [lead teacher] has come back and shared ideas after the meetings and we've all taken things on board that he's said and used them in our lessons, even if we've not been working with the Level 6 and beyond children.*' As noted above regarding dissemination there was also some sharing in C3. In C4, the LA lead has seen, in some schools, transfer of skills into mathematics in particular, noting that '*pupils can now see the relevance of maths to science; and one school [not the school in this study] is using MPP materials from science in maths as well, and has now also started to discuss doing the same in English'.* In C5, the LA consultant noted that he saw evidence in schools of sharing learning in departments, with the 'plan, teach review' cycle permeating practice in departments, and in fact took improving the *department* as the main focus, encouraging schools to use MPP as a vehicle for departmental improvement: *'it is fundamentally about change in practice'*.

2. Impact on pupils' confidence and generalisation of learning skills including ability to make connections between their learning in one focus of the project to new contexts

In C1, the LA consultant noted that *'one targeted group had initial difficulty in working in groups, writing, expressing and sharing ideas but gained confidence through scientific writing (e.g. informal to formal use of language)*' which was supported by the MPP lead teacher. In C4, there were some specific improvements in confidence relating to graph drawing:

Cameo 4: Improved confidence in drawing graphs, and making connections to other contexts

The MPP lead teacher in the C4 schools noted that all teachers involved felt that the students were feeling '*a little bit more confident when it came to these questions that weren't related to content, but were just graph drawing, and before the actual project they were just leaving these questions alone, but now these kids, even the low ability ones, were prepared to give it a go'*. Previously, she continued, '*even in my own class I noticed when it was a graph question they were like Ah Miss I can't do this, but I noticed even at GCSE, they were willing to give it a go because they had spent all this time developing these skills, so they were definitely more confident when it came to these questions*.' The pupils interviewed in this school noted that *'It expanded our confidence, it increased as well. So we weren't that afraid when we got to GCSEs. If you feel afraid you might lose confidence and make a mistake.*'

They were also able to see transferability of these skills which they were more confident in: *'There were things like gradients that we'd done in maths before and you were thinking "I don't get this" in maths and then you go to science and it's like "Ooh! I understand now!" And you can apply it to maths and it'll be like it really did help us, not just in science*' The MPP lead noted an example of this: having been taught plotting line of best fit differently in science and mathematics lessons, students raised this with their mathematics teacher to ask about the right way to do it. She added *I just don't think that would have happened if we weren't focusing on science skills. So the students did think about the fact that these skills were transferable and why was it different in maths and they did question things.*'

In C5, there was evidence for increased pupil confidence from a range of sources, including the use of a confidence focused HSW questionnaire ('how confident are you in…'). The results of the pre-intervention version of the questionnaire helped with planning projects and were followed up with post intervention questionnaire. One school were using online version which *'will provide more analysis opportunities and consequently more valuable feedback.'*

Generic, transferable learning skills were identified as being developed in C1 by the school's MPP lead teacher in a number of areas:

- Pupils are encouraged to underline *key terms* (recognise, explain, compare and contrast) in questions before answering. Techniques such as this allow focus on progressing pupils from B to A grades (this group of pupils are frequently overlooked as focus is generally on borderline D/C pupils)
- Attention was drawn to skills needed for progression – at KS3 a level ladder was used for each unit, making explicit what they need to know for moving to particular levels, integrated with a student-friendly APP grid.
- AT KS4 E, C, A descriptors used to make levels explicit for pupils. Interactive plenaries were used with progressive questioning following Bloom's Taxonomy.

In C2, the science subject leader described wider skill development amongst pupils:

> *'In the past when we'd have had them working in twos or threes they're not sharing as many ideas and it's more methodical, whereas now… we're a bit more open-ended, we've got more opportunities to develop things further or take things in the direction they want to take them…. It's developed their enquiring minds and their skills, because they've developed skills from seeing somebody else: 'how did you know that's what you need in your table?' they're developing the ideas of what they need to put on their paper or when they're coming out of the practical sharing those ideas. And that's going to carry on... it's not going to stop*.' (C2 science subject leader)

The cameo below shows how pupils in C2 felt they had developed transferable learning from the focus in this school on group work:

Cameo 5: Pupil views of developing group work

In C2, pupils were able to articulate their development in effectively working as a group, and how this was transferable, noting. *'it was good working with different people because you don't normally talk to everyone in your class, so you get to talk to everybody.'; 'it was good because you get to hear other people's ideas as well as your own, so you can put all your ideas together'; 'sometimes they could think of things that you can't even think of'* '*At the start I wasn't a great fan of group work, but as the year went on, I did like it more, I got more and more comfortable with it, because I didn't like working with other people, but now I do… science has definitely helped with that.*'' *Group work in science helps with working with other people in other subjects, with working together, communicating, putting ideas across, and not taking control of the group, letting each person have their own role in the group*.' However, there was a feeling that the HSW skills, such as developing hypotheses, or planning experiments were not obviously transferable.

In C3, group work was also identified as being particularly successful, although the consultant here noted this took time to show its effects. In C4, as we note above there were some specific links made in relation to drawing graphs.

Learning point 8:
Some aspects of MPP - such as use of language, study skills, understanding levels and - most clearly - group work were more suited to use beyond the MPP work and into other aspects of science and into other subjects.

3. Impact on pupils' interest and engagement in science

The LA consultant in C1 gathered evidence of increased engagement with science from three separate surveys of pupils gathered by school staff on their learning experience and approaches used, and this was supported by teachers in the C1 school. The teacher noted that the skills-based approach was beneficial: *'pupil don't always realise what skills they have acquired, breaking down lessons into small tasks makes the lesson progress faster and pupils don't get de-motivated or bored'* and this was particularly successful with lower ability pupils who are *'more engaged with skills – there is evidence from the progress of pupils in*

the bridging course… the different approach to teaching is key – pupils like the 'fun' aspect of activities'.

In C2, the LA Consultant gave a range of evidence of the positive impact on engagement with science across the schools in her LA, linked particularly to group work:

Cameo 6: impacts on pupil engagement

The LA consultant interviewed pupils from the school in C2: '*really positive and they were saying things that were unusual… science was coming out as their favourite subject… that was a massive selling point; do you like it? "yes we love it", why do you like it "it's interesting"… These pupils were also quite secure in where they were going to go post-16. They had a view of science as a priority to them… it's not the most affluent of areas, there's high unemployment, and there's not a lot aspiration or challenge in life generally and not a huge employment there. So for them to be saying to me 'oh I want to do this and I need science to do it' was amazingly good. So they recognised that, but they were also enjoying what they were doing and they could see the skills that they were collecting.*'

'*When I interviewed pupils they all enjoyed doing the group work… Pupils liked it because they were more involved in their learning. It wasn't passive it was interactive. So it was a more enjoyable experience for them. It wasn't the teacher standing at the front talking to them, it was them doing things more and it turned things round by being more HSW-oriented.*'

Pupils were '*more engaged, more motivated, more interactive, just more involved in the lessons really and they just found it more enjoyable*.'

The pupils themselves - as indicated in cameo 5 above – were also very positive about the group work elements, and the teacher noted that the school had seen an increase in the number of pupils opting for triple science GCSE following involvement in MPP.

In C3, when asked about their enjoyment of and interest in science, pupils
Said that their enjoyment of science had increased particularly since Y7, and there was a desire to progress further with science, with interest in post-16 and possible careers in forensic science, beauty, medicine and science teaching.

In C4, the increased interest was related not only to the different approaches used, but their specific application by a particularly committed member of staff as these quotations indicate:

> *"I like biology - I love it, it's brilliant. [MPP lead teacher] had a really strong passion for biology and passed the energy on."*
>
> *"I personally like physics, even though it's hard I like the challenge."*
>
> *"I think it was to do with the teacher as well: [MPP lead teacher]. She was brilliant, the energy and the passion that she put into her work… then you'd enjoy science and look forward to it each lesson."*
>
> *"you'd leave the classroom wanting to stay."*

Learning Point 9:
MPP activities – delivered by skilled, motivated practitioners - clearly facilitated greater engagement with science

4. Impact on pupils' progress through teacher assessment

In C1, the LA consultant saw some improvement in attainment, but not always significant and difficult to causally link to MPP inputs, as did the teachers. In C2, the head of science felt confident there had been improvements in attainment that would feed through into improved GCSE grades, although there was not a clear set of data to support this. The same was true in C3, where the MPP lead teacher felt there was definite improvement in progression in self assessment of pupils, and hoped this would lead to GCSE attainment. IN C4, the lead MPP teacher had compared pre- and post-MPP skills tests, and found an improvement for most pupils, and linked this to 'a constant focus on skills'. The pupils in this school consistently linked their learning to their preparation for GCSEs.

The posters and the regular homework activities were felt to be useful, using lots of creativity and colours. "*It really, really did help with GCSEs; I still use those things* [e.g. acronyms to remember equations] *now*."

"*You go into your GCSEs knowing a bit, so when you see a word you can relate it, you know roughly what it's going to be about.*' examples of words - gradient, VT graph."

"It was a great help because it pushed us to help with our GCSEs when we started Triple Science."

In C5, the LA consultant noted that the MPP work was *"significantly shifting attainment".* For example, one school has shown an improvement of 21%over the last two years in their A*-C passes for two science GCSE's by focussing on understanding *'what L6 looks like'* in addition to teaching and learning issues.

Factors contributing to impact

These can be grouped together under a number of broad categories, as laid out below

1. At programme level

Several aspects of the programme were mentioned:

The MPP resources

These were seen to be very helpful in C1, but the quantity was initially overwhelming (also in C2), therefore LA consultant support in charting a path through the wealth of materials was vital. The LA adviser in C2 noted that '*The materials are absolutely excellent…. The disc is fantastic, and if there was one thing I would take away from the project it's probably that disc because it's got everything on it that you'd probably ever need… It was very comprehensive and a lot of thought had gone into it*.' The quality of the resources was also mentioned by the LA lead in C3.

New pedagogic approaches

Although not identified directly in all cases, the data presented above makes clear that using approaches centred on more open-ended, learner-focused activity paid dividends in all cases. This was explicitly recognised in C3, where the MPP lead teacher noted that this different way of working cited was a major contributory factor to success, stating that he '*had learnt that pupils can think for themselves and drive the lesson forward, it doesn't have to be to be led by the teacher.'* The LA lead in C4 also noted that *'pupils are being given more say in their learning'* and that *'teaching is now more investigative and open-ended'* summarising: '*yes you can improve results by doing really focussed projects like this, but I also saw the teachers develop, so this is a great way to develop their pedagogy, and working together, because if they see a project pinning everything together it gives us something to talk about in meetings, gets us to talk about pedagogy, and it was because there was a project there*.'

The model

The C3 LA lead noted that the developmental model advocated as part of the MPP project was a contributory success factor

2. At Local Authority level

Support from Local authority advisers

This was seen in C1, in terms of supporting use of resources, modelling, partnership teaching and facilitating networks. LA CPD sessions were praised in C2 by the MPP lead teacher: *I've had a chance to pick up new ideas and implement them. I've been able to use that with our classes, tell our department 'let's use some of these skills, like group work', and through taking information like pupils' work and their responses to questions, I've learnt that pupils within this science department... they're engaged.*' The LA lead identified these sessions as a particular strength, too: '*One of the big strengths was the INSET. They all really enjoyed that because we would demonstrate those activities and get them competing with each other and doing them, making it very concrete and inspiring them to take them on board and trial them with pupils*.' However, in C2 there was an issue with being allowed by senior leaders to access off-site support, despite supply cover being provided from the LA MPP budget. The C3 LA lead cited the local authority model as being a contributory factor In C4, the LA consultant supported teachers to use the materials effectively and brought in (paid for) additional consultant support when needed.

Cross- and intra-school collaborative working

In C1, LA-supported networks enabled teachers to learn from each other; and internally, a coaching model supported development in a collaborative environment. In C3, the LA lead cited *'the capacity of school and individual teachers being confident and able enough to understand what they are trying to do; and the ability to work with other teachers and disseminate'* as factors contributing to success. The MPP lead teacher in the C4 school explained the importance of a series of network meetings: '*it wasn't just the first meeting, it was every meeting, I came out wanting to do more, because it is difficult, we are all really busy, so to do something like this takes a lot of time and I actually wouldn't do it if it wasn't for the meetings*.'

3. At school level

The MPP lead teacher

We noted above that the lead teacher was important. In C4, the school involved in this evaluation had one highly motivated and committed teacher who re-wrote activities for her pupils, and made the aims and skills extremely explicit to them, and the teaching of them

very structured. However, now that she has left this school it is unclear whether any other teachers will take on the role of coordinating and pushing MPP.

Engagement and capability of other teachers

In C1, the MPP lead identified that staff at the school were both skilled and prepared to *'have a go'* at things, and the LA lead in C3 expressed similar sentiments. In C2, the MPP lead added that continuity of teacher involvement was vital, and this impaired the likelihood of success where it wasn't present.

Selection of pupils

The LA lead in C3 noted that matching the right pupils to the right teacher was important.

Senior leadership support

This was identified as crucial in C2 by the MPP lead teacher, and the LA lead in C4 noted that head teachers were contacted in writing in the first instance, and supported teacher attendance at network meetings and *'subject leaders have all been very supportive'.*

Concluding summary

Maximising Pupil Progress has been a successful intervention programme which has had impact on pupils, teachers and science departments throughout England. The programme was based on a robust rationale of identification of strands of learning and barriers within the strands which limit progress at KS3; levels of progress within the each strand; learning steps required to make progress through the steps and resources and intervention strategies to support progress through the steps

A wide range of high quality materials and strategies for securing progress were developed and made available to teachers during the course of the programme. These were well received and effectively supported teachers' and pupils' work in the classroom. A significant contribution to the success of the programme was the flexibility to shape the programme to suit the needs of local authorities and schools both in terms of the model of engagement and pathways within the programme.

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