

**An Evaluation of the Promoting Improvement in
English and Mathematics
(PIEM) Project**

July 2016

ETI: Promoting Improvement in the Interest of all Learners



The Education and Training Inspectorate
Promoting Improvement

Providing inspection services for:

Department of Education
Department for the Economy
and other commissioning Departments



1. Introduction

The vision of the Department of Education (DE) is “Every young person achieving his or her full potential at each stage of his or her development”.

It is accepted widely that school leavers who attain the key target of achieving five or more GCSEs at grades A*-C (or equivalent Level 2 qualifications), including GCSE English and GCSE mathematics, are ready to progress to further education or employment.

The Programme for Government (PfG) 2011-15¹ makes the commitment to:

- increase the overall proportion of young people who achieve at least five GCSEs at A*-C or equivalent, including GCSEs in English and mathematics, by the time they leave school; and,
- improve literacy and numeracy levels among all school leavers, with additional support targeted at underachieving pupils.

Specific targets include an increase in the overall proportion of young people achieving this level by the time they leave school to 61% by 2013, rising to 66% by 2015 and an increase in the proportion of young people from disadvantaged backgrounds, which for this purpose was taken to be pupils who were entitled to free school meals (FSME), who achieve at this level from 42% to 49%.

The action plan produced by DE identifying key steps to be taken to meet the PfG targets included a number of initiatives, for example, the *Delivering Social Change: Improving Literacy and Numeracy Signature Programme*.

In 2013 the ETI issued a report of a Survey of Best Practice in English and Mathematics in Post-primary Schools². The survey focused specifically on those schools which achieve good outcomes in external examinations, particularly in relation to the proportion of pupils achieving the key attainment target of five or more A*-C grades

1 <http://tinyurl.com/pfg-2011-2015-report>

2 <http://tinyurl.com/Best-Practice-En-Ma-PP-Schools>

including English and mathematics at GCSE (or equivalent), with an emphasis on those schools that have a relatively high level of FSME. The outcomes of this report were disseminated at two well-attended conferences. In 2014 the ETI issued a *Second Report on the Follow-up to Better Mathematics*³. This report, along with its predecessors, and the *Better English*⁴ report (2011) summarises inspection outcomes over a two-year period and identifies effective practice.

In the summer term of 2013, the ETI was also commissioned to undertake a more specific support project which became known as the Promoting Improvement in English and Mathematics (PIEM) project.

The project had five main objectives:

- to raise the achievement of the pupils in English and mathematics and, in particular, of the FSME pupils thereby enhancing their opportunities for employment or further study;
- to improve the overall achievement of the school as measured by the headline figure of the proportion of pupils achieving five or more GCSEs at grades A*-C (or equivalent), including GCSEs in English and mathematics;
- to improve the overall percentage of FSME pupils who achieve five or more GCSEs at grades A*-C (or equivalent), including GCSEs in English and mathematics;
- to identify the key strategies which were particularly helpful in raising the achievement of the pupils and to disseminate these strategies both within the school and more widely; and,
- to build capacity at middle management/head of department level to ensure that any improvement will be sustained once the support programme comes to an end.

3 <http://tinyurl.com/Second-Report-Better-Maths-PP>

4 <http://tinyurl.com/Better-Eng>

The report which follows is based on the development work undertaken in 19 schools in either English or mathematics over a two-year period and the impact this work has had on raising the standards achieved by the pupils in these subjects and, importantly, in 'closing the gap' between the FSME pupils and their peers.

This report contains three main sections; a high-level summary followed by two, more detailed, annexes, one for English and one for mathematics. A certain degree of overlap exists in these two latter sections and this has been retained in this report in order to emphasise that there are generic issues faced by both subjects and to make each annex useful to each subject-specific community. The commonality of many of the enablers for, and barriers to, improvement suggest that they are not just confined to either English or mathematics, but may present in any subject area within a school.

The report draws heavily on the commentaries the schools were asked to provide at the end of the project, through which each school described its journey to improvement.

2. Methodology

Schools participating in the project were identified, on the basis of data provided by the Statistics and Research Team within DE, focussing on a number of criteria namely:

- schools with a wide variation between their headline figure for any five GCSEs at grades A*-C (or equivalent) and their figure for five or more GCSEs at grades A*-C (or equivalent), including GCSE English and GCSE mathematics;
- schools in the above category with a variation between the performance levels in GCSE English and GCSE mathematics;
- the size of school, with preference being given to large(r) schools in order to maximise the impact of any intervention; and,
- schools which have a high number of FSME pupils.

The schools participating in the project demonstrated that there are a significant number of capable pupils who are achieving across a range of subjects, but are failing to achieve as highly in one of the important subjects of English and mathematics. Several other schools considered for inclusion in the project were eventually excluded as it was likely that they would be included in the inspection cycle during the two years of the project.

Four experienced ETI inspectors, two English and two mathematics specialists, took the lead in the project for half of their scheduled time. After an initial baseline visit by the specialist inspectors, regular specialist visits were conducted over the period of the project. During these visits the inspectors:

- observed lessons and engaged in improvement conversations about learning with teachers, heads of departments and senior leaders;
- engaged with the pupils both in lessons and in focus groups to hear the pupils' views on their learning experiences;
- engaged in professional dialogue with middle and senior leaders to build leadership capacity at all levels; and
- supported and challenged teachers, heads of department and senior leaders to promote improvement in English and mathematics.

To support the work in the schools further, two experienced heads of highly effective post-primary departments were seconded as Inspection Associates (IAs) to work alongside the ETI from May 2014 to June 2015. The IAs participated in development work with the departments, attended departmental meetings and provided support and challenge, where appropriate, in the departmental action-planning process. In addition, they facilitated improvement dissemination workshops for the participating schools.

A number of these workshops were held, beginning with a briefing for the principals and their heads of department. During this initial meeting the aims of the programme were communicated and the schools were invited to present the background of their school by way of context and to outline their initial perceptions and expectations of the programme. Following this first step, two further opportunities were arranged for the heads of English and mathematics to meet together where they presented to each other exemplars of good practice.

It is important to note that, whilst there were some common areas where improvement was required, all of the schools did not necessarily present with the same issues for development. Each school's context was different; consequently the nature of the support provided was tailored to need.

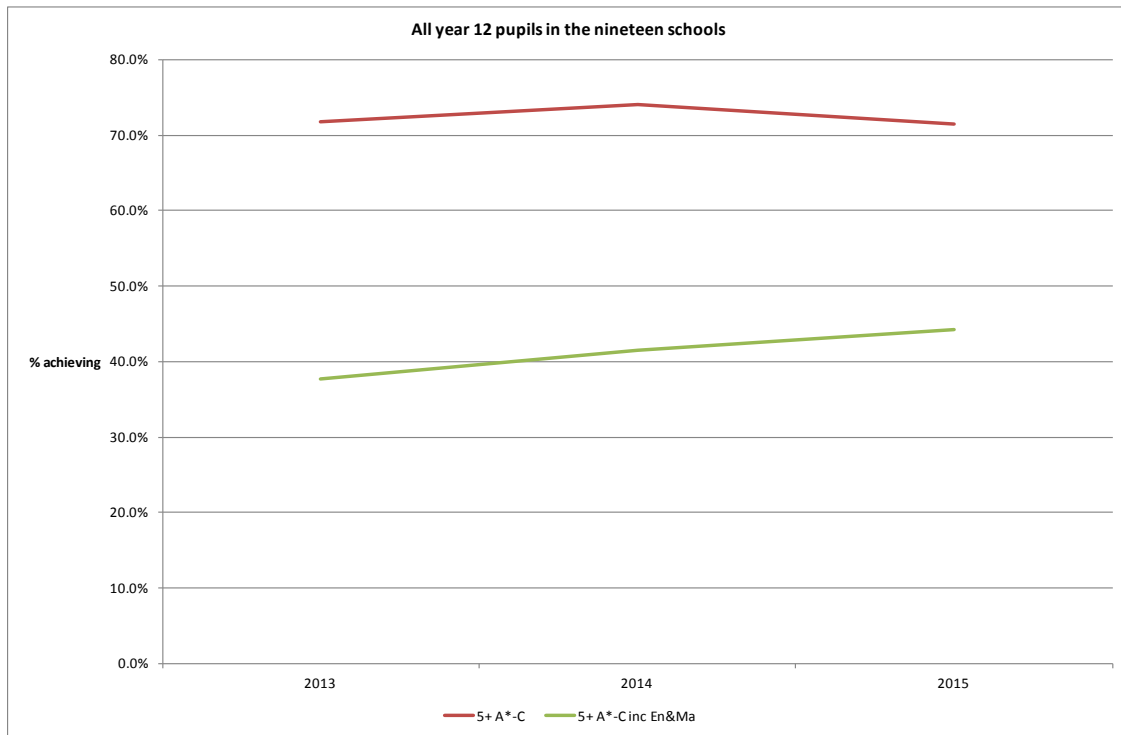
As part of the development process, subject departments were asked to keep a reflective journal. Heads of department were asked to include in this journal a record of their personal and pedagogical reflections alongside details that described, explained and evaluated the impact of actions on the provision and outcomes in the subjects. Through this journal, the heads of department, and their teachers, were encouraged to understand that reflection can help turn the pupils' experience into more meaningful learning. Towards the end of the project, the schools were asked to prepare a commentary describing their journey to improvement; these commentaries drew heavily on the evidence captured in the reflective journals. The maintenance of the journal was also aimed at promoting discussion within the departments leading to more collaborative working practices and to a common understanding of how to effect improvement in a consistent, and collegial, manner across the department.

At the end of the project, the ETI re-visited the schools to evaluate the extent to which the school had improved the provision for its pupils. The team of specialist inspectors included, as far as possible, one inspector who was involved in the baseline visit, accompanied by another specialist inspector who had not been involved in the project. This addition was to give greater objectivity to the final evaluations. The Inspectorate of the Department of Education and Skills (DES) was requested to quality assure (QA) the ETI's internal evaluation of the PIEM project.

3. Key Findings

During the two-year period of the PIEM project, the pupils in the schools have benefited from the improved provision for learning and teaching.

The proportion of pupils in the nineteen schools achieving the pathway qualifications of five or more GCSE qualifications (or the equivalent) at grades A*-C including English and mathematics has increased by 6.5 percentage points (Figure 1). Over the same period the Northern Ireland (NI) percentage average 5+ A*-C including English and mathematics (or the equivalent) for all schools increased by 6.1%.

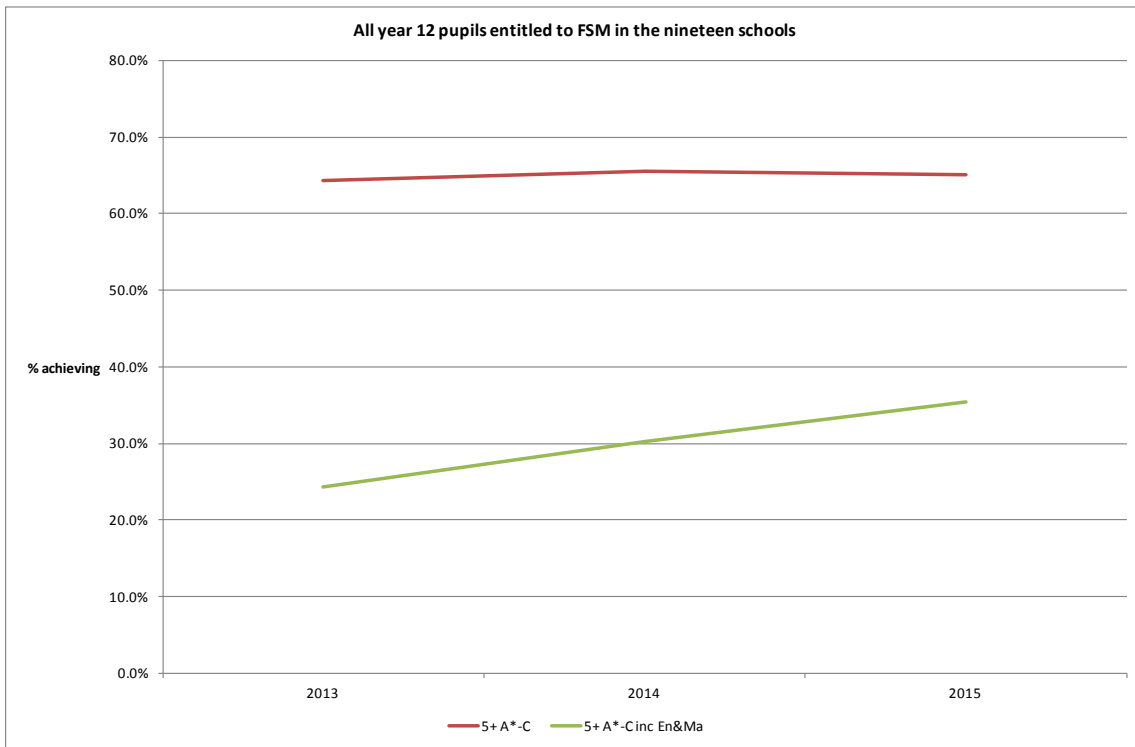
Figure 1**The standards attained by all year 12 pupils in the 19 participating schools**

It is interesting to note that, in the nineteen schools, the percentage of pupils achieving five or more GCSEs at grades A*-C or equivalent actually dropped between 2013-14 and 2014-15. This drop is not reflected in the overall statistics for NI. In 2014-15 the overall numbers of pupils achieving five or more GCSE qualifications rose by one percentage point from the 2013-14 level.

The proportion of FSME pupils achieving five or more GCSEs at grades A*-C, including English and mathematics (or equivalent), over the same period increased by 11.0 percentage points (Figure 2). The proportion of FSME pupils across all schools in NI achieving these qualifications increased by 11.7 percentage points.

Figure 2

The standards attained at GCSE by all year 12 FSME pupils in the 19 participating schools



There has been overall improvement across the nine schools where the focus of PIEM was on English. The following improvements are particularly noteworthy:

- the overall quality of learning and teaching improved in seven of the nine departments;
- the attainment at GCSE improved in eight of the nine schools, with a marked improvement in five;
- the overall standards in English, including the quality of the pupils' written work, their levels of confidence and the quality of their oral responses, improved in seven; and,
- the quality of the leadership of the English departments improved in eight of the nine schools.

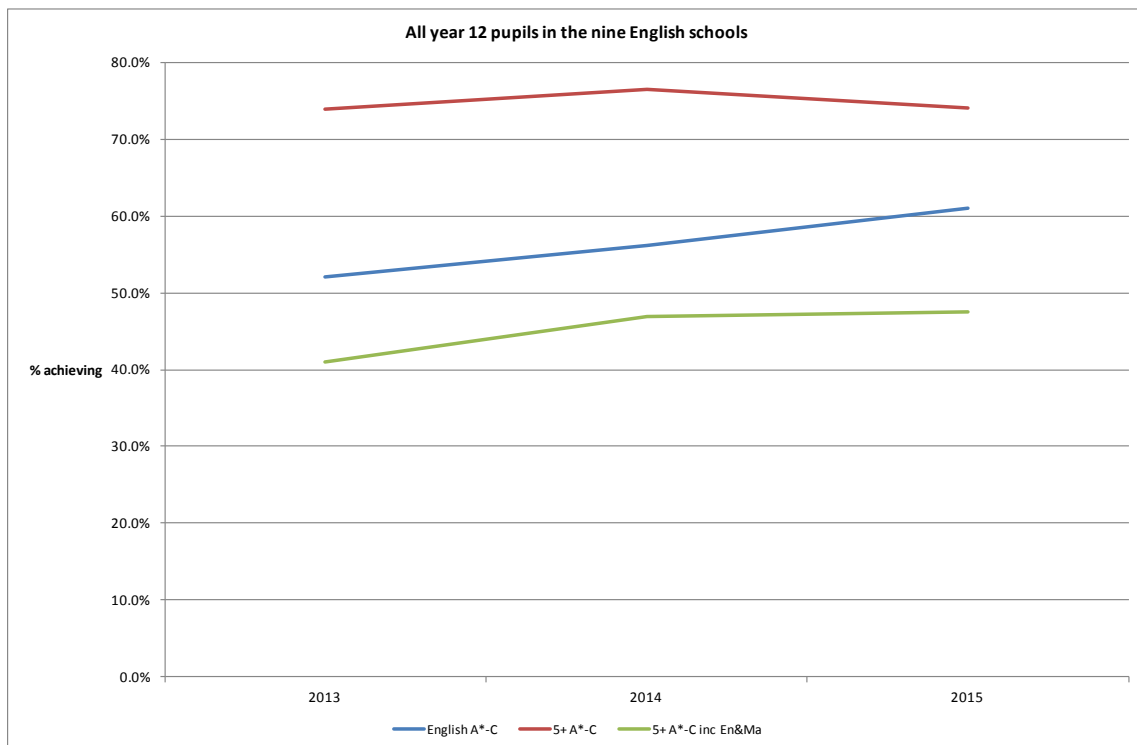
Consequently, a greater proportion of the pupils within these schools are benefiting from richer learning experiences and improved standards. They achieve higher levels of attainment in English which are more commensurate with their ability.

The standards achieved by the pupils in GCSE English improved in seven of the nine schools which received support; the standards remained steady in one school and fell in one other. In the one instance where standards fell, the school had changed its entry policy since entering PIEM and moved to a significantly more inclusive arrangement which gave a higher and more appropriate proportion of pupils access to the GCSE qualification.

The overall increase across all nine schools in the percentage of pupils achieving grades A*-C in GCSE English was 8.9 percentage points, rising from 52.1% to 61.0% (Figure 3).

Figure 3

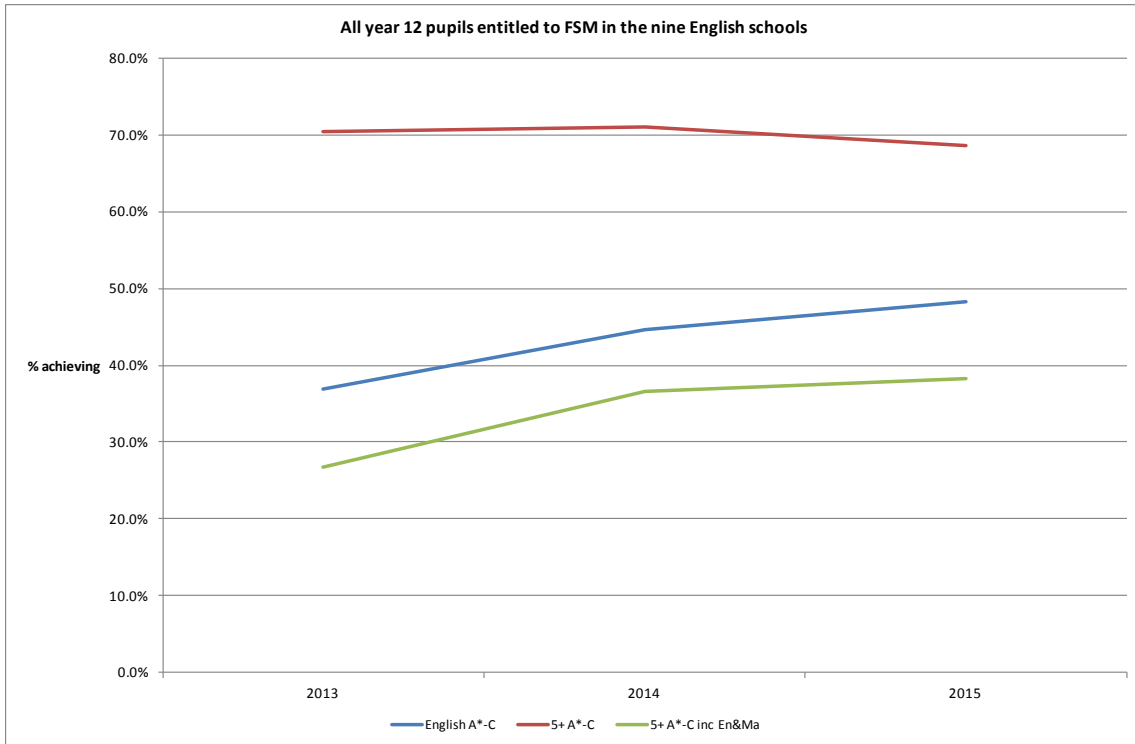
The standards attained in GCSE English by all year 12 pupils in the nine participating schools



The improvement for the FSME pupils was even more marked, rising by almost 11.3 percentage points from 36.9% to 48.2% (Figure 4).

Figure 4

The standards attained in GCSE English by all year 12 FSME pupils in the nine participating schools



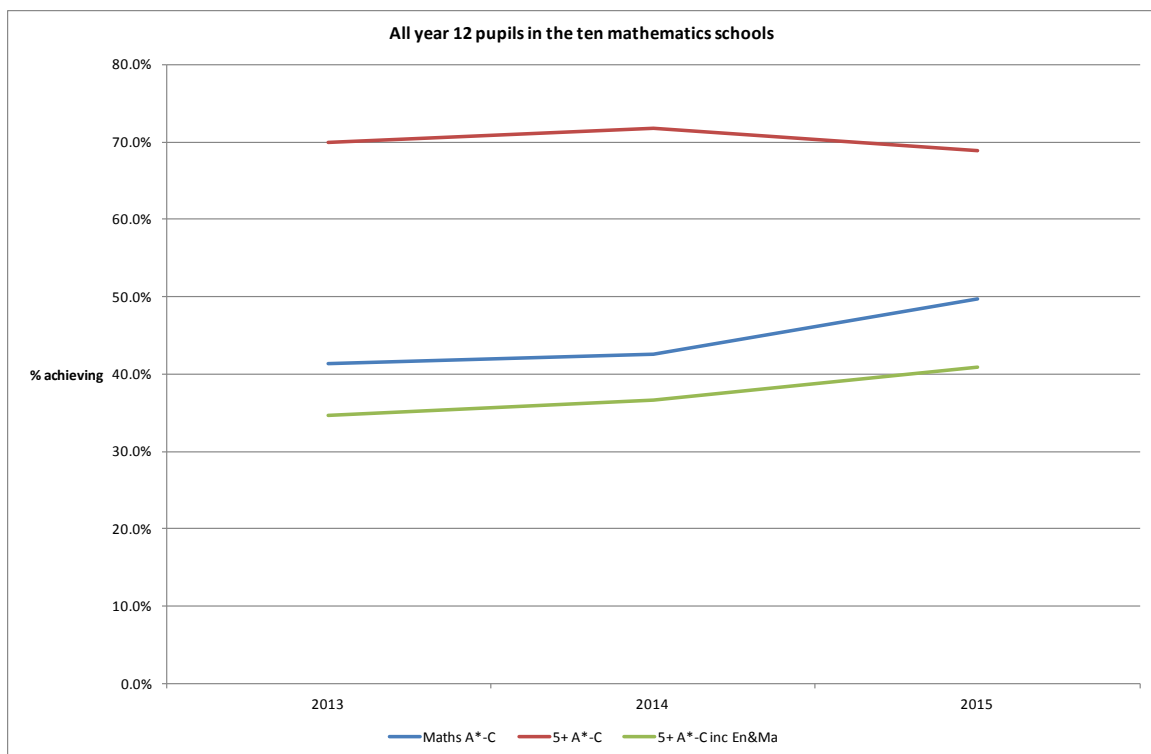
There has been overall improvement across the ten schools where the focus of PIEM was on mathematics. The following improvements are particularly noteworthy:

- the overall quality of learning and teaching improved in seven of the ten departments;
- the attainment at GCSE improved in eight, with a marked improvement in five;
- the overall standards in mathematics, including the quality of the pupils' written work, their levels of confidence and the quality of their oral responses, improved in six; and,
- the quality of the leadership of the mathematics departments improved in seven of the ten schools.

As a result, overall, a greater proportion of the pupils within these schools are benefiting from richer learning experiences and improved standards, and achieve higher levels of attainment in mathematics which are more commensurate with their ability.

Figure 5

The standards attained in GCSE mathematics by all year 12 pupils in the 10 participating schools

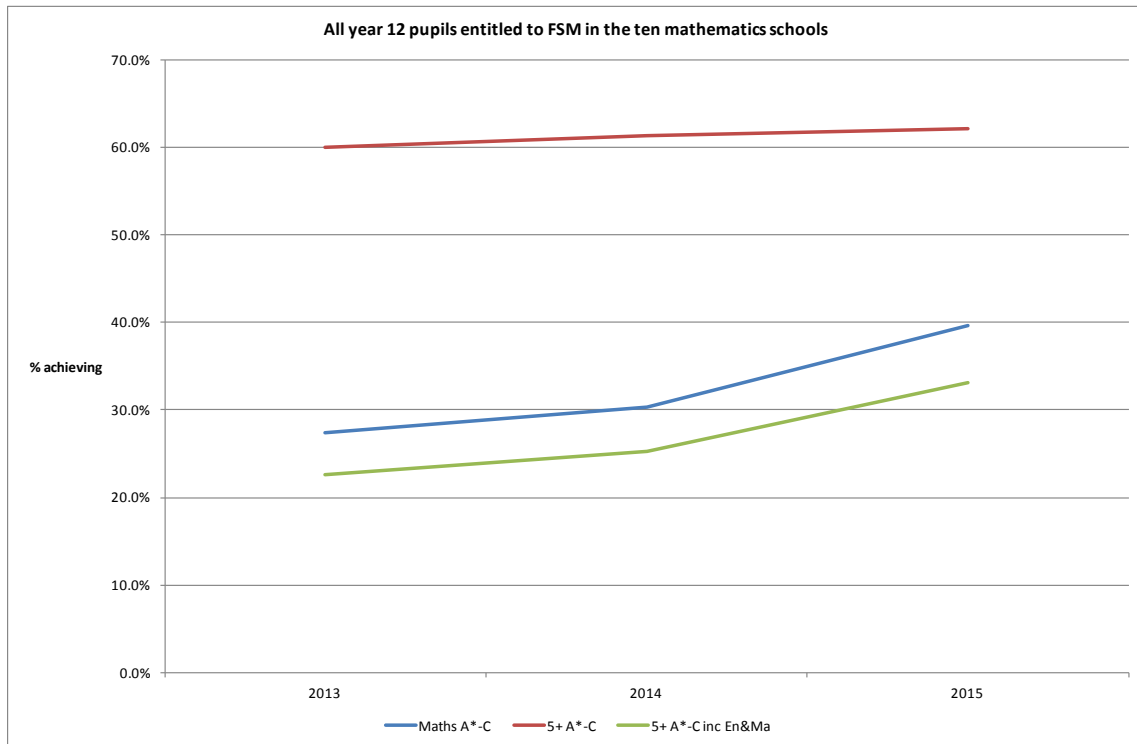


The overall increase across all ten schools in the percentage of pupils achieving grades A*-C in GCSE mathematics was almost 8.4 percentage points, rising from 41.3% to 49.7% (Figure 5).

The improvement for the FSME pupils was even more marked, rising by almost 12.3 percentage points from 27.4% to 39.7% (Figure 6).

Figure 6

The standards attained in GCSE mathematics by all year 12 FSME pupils in the 10 participating schools



There were a number of key enablers which led to improvement in both English and mathematics:

- committed and enthusiastic teachers who reflect regularly on their practice and engage positively with change, particularly when change is urgently needed;
- strong collegiality amongst the teachers who, under the effective leadership of the head of department and through regular discussion and debate, reach a shared understanding of what constitutes effective learning and teaching;
- planning which is focused on learning and underpinned by the teachers having a secure subject knowledge, a clear understanding of the what the pupils can do and high expectations of what they can achieve;
- high-quality learning which is engaging and relevant to the pupils' lives, and which engenders self-belief and provides opportunities for pupil success and achievement; and

- effective leadership which takes responsibility for improving the quality of learning and teaching, provides professional development for teachers and, when appropriate, challenges ineffective classroom practice.

In addition, a number of barriers resulted in the improvement being less than intended. Three main factors were found to militate against improvement, namely:

- the reluctance of teachers to improve their practice in light of the changing needs of their pupils and the demands of a rapidly changing society;
- the low expectations held by teachers and accepted by leadership; and
- the failure of leadership at all levels to challenge and address poor classroom practice.

These key enablers for improvement and these barriers are explored in more detail in the subject-specific sections.

4. Conclusion

It is clear that, to date, the outcomes for the pupils have improved in nearly all of the schools. In the small number of schools where the success was less evident, there tended to be specific reasons which have been explored in this report.

Overall, the project has been a success and has highlighted, and reinforced, key areas of best practice in the teaching of English and mathematics.

However, challenges remain. The project aimed to build capacity within departments so that the improvements identified in the report are sustainable. It is clear that in most instances we can be confident that this capacity-building has been effected.

Indeed, in the best practice, the work undertaken in the English and mathematics departments has been disseminated to other departments in the school.

Participating in PIEM has given us a tremendous opportunity for capacity building, not only for the head of mathematics, but also for other heads of department and curriculum leaders.

St Colm's High School

The practice of using data to produce predicted and target grades and analysing the accuracy of target-setting used in the mathematics department has been fed into processes across all departments in the school at KS4 during 2014-15. The lessons learned through PIEM shaped the current procedures for tracking all GCSE subjects and this process is to be further enhanced in 2015-16. One of our key priorities at whole-school level is improving learning and teaching and the mathematics department is now in a position to take the lead and share their good classroom practice with other staff to raise standards at whole-school level.

St Mary's College

During the two years of the PIEM project, external support and challenge have been provided to the participating schools by the inspectors and the IAs. Where improvement was most marked, support and challenge were also provided internally by leadership at all levels. This sharper focus has ensured that teachers, both individually and collectively in departments, have come under greater scrutiny and have undertaken, sometimes reluctantly, a deeper, and more honest, reflection of the impact of their work on pupils' learning and, as a consequence, have improved their practice.

Richard Elmore stated that: '*Privacy of practice produces isolation: isolation is the enemy of improvement.*'⁵ A key element of the PIEM project, and one which needs to be built upon more widely, is the work undertaken by the teachers not only in working together within their own school, but also in developing networks with other schools facing the same challenge of improving learning and teaching and raising attainment. A measure of the long-term success of the PIEM project will be the extent to which, in the respective English and mathematics departments, teachers will continue to network effectively both within their own schools and more widely within the existing subject-specific communities. It is only by having the willingness to challenge their own practice, being open to constructive challenge from others, and adopting, where

5 Building a new structure for school leadership by Elmore R F (2000) available at <http://www.shankerinstitute.org/sites/shanker/files/building.pdf>

appropriate, fresh ideas that teachers will maintain their enthusiasm and provide the learning experiences to which all their pupils are entitled.

The long-term success of the project has yet to be determined. A key objective of the project was to disseminate the strategies that were successful in 'closing the gap' more widely; the mechanism for achieving this element of the project will be developed as the next stage of the process.

5. Recommendations

For DE there is a need to:

- disseminate the findings of this report;
- prioritise the provision of appropriate subject-specific and high-quality continuous professional development for the teachers of English and mathematics; and
- affirm the role of the Education Authority (EA) to challenge ineffective practice at all levels as part of their support and improvement role.

For the EA there is a need to:

- promote and facilitate appropriate subject-specific, high-quality, continuous professional development;
- identify, through an appropriate risk assessment process, underachieving English and mathematics departments and provide bespoke support and challenge for these departments and schools;
- ensure that teachers, individually and collectively, network effectively with their peers and across subject-specific communities; and
- ensure that Northern Ireland subject-specific communities thrive (eg through increased use of on-line tools such as Fronter) and help promote best practice.

For the ETI there is a need to:

- challenge and support teachers and leaders to ensure that teachers, individually and collectively, do not practice in isolation from their colleagues and the wider subject-specific communities; and,
- develop inspection models that facilitate the challenge and support function of the ETI within a school or subject department over an extended period.

For schools (teachers, senior leadership teams and middle managers):

- teachers, individually and collectively, need to resist practising in isolation from the other teachers in their own school and within the NI subject-specific communities. Furthermore, they need to reflect on and adopt, when appropriate, established and innovative ideas in order to maintain their enthusiasm and provide the learning experiences to which all their pupils are entitled;
- senior leaders and middle managers need to make greater use of their pupils' views as a source of first-hand evidence; and,
- leaders, at all levels, need to challenge ineffective practice and teachers' disposition to practice in isolation from others within their school.

Annex A: English

The NI Curriculum has long recognised the importance of the promotion of English in order to develop pupils as individuals, contributors to society and contributors

to the economy. A good post-primary English experience equips pupils with the understanding and skills required for accessing all aspects of the curriculum and empowering them to participate fully in a widening range of local and global communities. Achieving a grade C, or higher, at GCSE is a key enabler for widening pupils' educational pathways and life chances generally.

Like many post-primary schools, all nine schools in the project had varying degrees of under-achievement. Consequently, the schools provided with support in English focused on raising further the pupils' attainment at GCSE level, while increasing their capacity to lead and manage sustainable improvements to learning and teaching.

This section on English is arranged in four parts: engagement with process; planning; learning and teaching; and leadership and management. Within each of these sections, *enablers for improvement and barriers to improvement are identified.*

1. Engagement with the process

Enablers for improvement

Nine English departments participated in the PIEM project. Initially, there was a variation in the extent to which engagement in the process was accepted and welcomed by the schools. Each school was at a different stage of readiness to engage in the process and accept it as an opportunity for positive change, leading to further improvement in the learning experiences of, and standards achieved by, their pupils.

In seven of the nine schools, the baseline evaluations were accepted and acted upon swiftly; these schools took greater ownership of an improvement agenda, overseen closely by a supportive senior leadership team, which created actions that led to significant improvements in pupil learning and attainment. Where acceptance of, and full participation in, the project was not so forthcoming, there was continued reluctance that manifested itself in mistrust of the project and anxious working relationships.

As the project progressed, most of the schools became more accepting and trusting of the process. Once these barriers were overcome, these schools began to embed an improvement agenda that was matched closely to individual needs and circumstances. Through the highly adept facilitation skills of the IA, support was provided at the point of need, while cluster meetings and networks with the other participating schools were developed.

During the organised PIEM cluster meetings, conferences and through the Fronter environment, all the heads of departments had opportunities to meet and discuss their improvement priorities with other colleagues who had similar first-hand experience and shared understanding of the challenges faced. In addition, the heads of department could identify common issues, share the most effective strategies and be reassured that, given their differing, but similarly challenging contexts, there are no quick or easy fixes. The value of this network lay in allowing the heads of department to communicate closely with each other to acknowledge and articulate a need for change that lay rooted in making well-considered improvements to pedagogy and measuring their impact rigorously. Such meetings were about linking actions to impact. Consequently, engagement remained relatively positive amongst nearly all of the schools in the project throughout the two years of the initiative.

When the ETI informed us that we were to be included in the PIEM programme, there was an initial reaction in the department which ranged from resignation to anxiety and even dismay. However, after the initial meeting, I was convinced that this was not about judging, but about facilitating real improvement in a supportive and professional way. The transparent objectives, with their emphasis on learning and teaching, helped to convince me and the rest of my department that PIEM was something to embrace.

Holy Cross College, Strabane

Being part of the PIEM initiative has been beneficial in many ways for the English Department and the entire school through the sharing of good practice. Much of what has been achieved was by establishing a positive culture, an ethos of aspiration and a commitment to professional growth. Throughout the process there has been a clear focus on self-evaluation, the use of all available data, tracking and target setting to improve the culture of achievement for all pupils and a focus on pedagogy to create a productive learning environment which is engaging and fulfilling for all pupils.

Ballyclare Secondary School

Barriers to improvement

The main barriers to engagement included the perception by some that this programme was an unnecessary imposition. There was reluctance in some schools to believe the positive nature and purpose of the support which was fuelled by a negative attitude to, or lack of trust in, the ETI. In addition, there were some cases where there was a lack of belief in the department's own capacity for improvement, or acceptance of the need to raise standards further. There was an initial perception that the ETI involvement was a slight on the teachers' professionalism, impacting on their standing among their colleagues in school and beyond. In a small number of cases, there was a belief that outcomes were good enough not to warrant the need for outside support.

Over the time of the project, the schools' relationship with the ETI became more positive and, in nearly all instances, was valued highly. However, there remained some lower levels of engagement in a few isolated cases.

The ETI acknowledges fully that the starting point for improvement work is building upon the existing effective practice in all the schools selected. To this end, the ETI worked alongside the departments, offering support and appropriate challenge through professional dialogue and mentoring. In addition, the ETI facilitated the opportunities for the nine departments to liaise and share good practice through, for example, the conferences and the use of the C2k online learning environment, Fronter.

2. Planning

'Better English'⁶ published by the ETI in 2011 indicates that good planning for learning and teaching is essential when trying to bring about improvement. Effective planning promotes improvement significantly by encouraging consistency in the learning experience and informing progression, transition and coherence within English. Furthermore, it helps ensure that the learning and teaching strategies and resources meet the needs of all the pupils. In the best practice, the planning for learning and teaching is the result of a collaborative process, which involves all the members of the department and includes the pupil voice. Pupils benefit from planning that is learning-focused and where there is consistency across the teaching. The planning for KS4 needs to be much more than a GCSE specification, which in too many cases, is used as a proxy scheme of work.

At the outset of the project, the quality of the planning across all schools engaged in PIEM was variable. The more effective planning contained information on what the pupils will learn (know, understand or can do), rather than a series of activities for them to complete. At KS4 there was a dependence on the examination specification, which became the key de-facto planning document. Through the course of the project, all departments accepted comments from inspectors and made amendments, to varying degrees of effectiveness, to how they planned for learning.

Over the period of the project, the barriers to planning were exacerbated by challenges created through external changes to aspects of the examination specifications and, in particular, the changing foci of controlled assessments.

Enablers for improvement

Where improvement was most effective, the planning:

- recognised the inextricable links between the learning needs of pupils and high expectations for all in terms of maximising individual potential and outcomes;

6 <http://tinyurl.com/Better-Eng>

- built upon the acquisition of English skills at KS3 and was planned to meet the higher end standard required to achieve grades A*-C at GCSE level;
- was focused appropriately on learning, going well beyond the perfunctory completion of, often low-level, tasks or activities;
- was media-rich, where social media was used purposefully to enhance the learning experiences and engage the pupils more fully;
- offered ample opportunity for appropriate differentiation, so that the identified learning needs of all the pupils are being addressed within and beyond the classroom; and
- was separate from the GCSE specifications and detailed more tailored learning experiences that were better suited to the pupils' interests and needs through well developed KS4 schemes of work.

Target setting and active monitoring of pupil progress became key actions that led to improvement for our students. We recognised the significance of individual targets and its impact on students' ownership of learning and self management. The students developed heightened awareness of their individual targets and there were time-bound steps planned to ensure they achieved well.

St Joseph's College, Belfast

We have demonstrated a clear focus on learning, as opposed to focusing on task, accompanied by planning for progression across a key stage and the comprehensive development of tracking across KS4 English through increased monitoring, evaluating and standardisation. These aspects will continue to grow and evolve over the next number of years and the learning points of the process will be used in future capacity-building for middle managers.

Parkhall Integrated College, Antrim

The development of e-learning remains a priority, with key members of the English department involved in whole-school training on tablet technology. Examples of planning for e-learning include:

- *ShakingSpeare*
- *Fronter*
- *Simple Mind*
- *Philip Allen (for Lit)*
- *Display Note*
- *Quizlet*
- *Kahoot*
- *QR Codes*
- *Nearpod*
- *My Story*
- *Rory's Story Cubes*
- *Comic Life*

St Mary's Christian Brothers' Grammar School, Belfast

Following an observation visit by two ETI Inspectors and subsequent meetings with the English department, we decided to set as a focus a new approach to planning for learning, where coherent planning from Year 8 to 12 builds the necessary key skills, knowledge and understanding. We adopted a 'branded' approach to planning, where all members of the English department worked collaboratively to ensure that schemes of work were completely rewritten to bring about effective learning.

Other agreed areas for improvement included a fresh focus on assessment and progression of learning, along with the development of talking and listening skills in all English classrooms. Alongside this approach, we ensured that the new plans were supported with up-to-date, relevant and engaging new resources and a determined effort to make each classroom a stimulating environment which enhances learning.....

At both KS3 and 4 we are making sure that planning reflects a greater emphasis on learning activities to develop talking and listening skills and also, at both key stages, that our planning shows a determination to develop the skills necessary to analyse literature effectively.

In terms of the impact of these actions, we are now seeing that pupil voice reflects a greater enjoyment of English in all year groups and staff reflections demonstrate increased confidence in how to improve learning. Our regular monitoring of their work shows significant improvement in the pupils' demonstration of key skills.

Belfast Boys' Model School

Whilst our bespoke units at KS4 were praised by the ETI, we identified the need to tailor assessment criteria to the boys: CCEA's mark schemes and criteria for assessment are written for teachers, not pupils. KS3 and KS4 assessment criteria were rewritten in 'pupil-friendly' language, giving our boys more insight into how their work is assessed, but, more importantly, how they can improve.

Ashfield Boys' High School, Belfast

Barriers to improvement

Where improvement was less effective, the planning:

- was poor or non-existent, which led to inconsistency in teaching approaches and a variation in the quality of the pupils' learning experiences;
- was tailored insufficiently to address the strengths and weaknesses of particular cohorts of pupils; and
- was not sufficiently or regularly reviewed or evaluated, running the risk of being outdated, less relevant and inhibiting high pupil expectations and outcomes.

3. Learning and teaching

The ETI publication *Best practice in English and mathematics*⁷ (2013), alongside *'Better English'*⁸ (2011) details the characteristics of effective learning and teaching in English and highlights the importance of ensuring lessons are engaging, matched to pupils' needs and develop greater independence in learning. Learning and teaching in English should fuse reading and writing for learning through high-quality talking and listening. Better learning in English is active, pupil-centred, and engaging, where pupils can progress their understanding and application of knowledge and skills. Better teaching in English is dialogic, challenging, supportive and inspiring. Higher-quality English provision is transformative, resulting in better learning experiences and outcomes for the pupils, which can develop pupils as individuals, contributors to society and to the economy.

English supports significantly the acquisition of wider literacy and digital literacy skills, but, unless this is developed across other subjects in the curriculum, the pupils will not become secure in demonstrating these skills within English and beyond, and for life.

7 <http://tinyurl.com/Best-Practice-En-Ma-PP-Schools>

8 <http://tinyurl.com/Better-Eng>

The ETI talked to groups of KS4 pupils about their learning preferences in most of the schools. Almost all of the pupils reported how a wider range of learning strategies engaged their participation and heightened their interest in, and understanding of, the subject. These active learning strategies included: paired and small group work, peer assessment, role-play, hot-seating, presenting findings to the rest of the class in a range of formats, including an imaginative use of Information and Communication Technology (ICT). The pupils also stated a preference for written feedback which, as well as praising strengths in their work, pointed out ways in which they could improve the work. Linked to this, many of the pupils were positive about being set targets for improvement, often in close and purposeful dialogue with their teachers.

We initially agreed six active learning strategies which we would introduce over one term and identified where they would fit within our schemes of work. This involved an element of risk as teachers expressed concerns about the potential impact on classroom discipline and were apprehensive about moving towards learner-led lessons. It was agreed that during this term TCN visits (trusted colleague network) would focus on the use of active learning strategies within English.

This pilot of active learning strategies was a huge success, with increased levels of enjoyment and engagement evidenced almost immediately. Very quickly 'just a minute', 'carousel', 'stick debate', 'snowballing' and others became familiar language and common practice within our classrooms. Boys enjoy the rapid pace, the competitive spirit, the movement and the interactive elements within lessons where active learning is employed. A follow-up pupil voice exercise proved that this was having a positive impact upon their experiences and learning within English. Inevitably, teachers put their own spin on our initial six strategies and, before long, our list had blossomed into a library of effective strategies which were embedded into our schemes of work and our departmental handbook.

St Mary's Christian Brothers' Grammar School, Belfast

St Joseph's English department had a sharp focus on improving the environment for learning. We fostered a positive environment where there was a culture of 'taking risks for learning', to promote better individual ownership of learning amongst our students. PIEM promoted greater understanding of the importance of pupils' experiences of English and this is now embedded in the department's planning. Corridor and classroom environments stimulate and motivate students; teachers are involved in design and displays, for example the 'Dead Word Graveyard'. Students' work is visible and newcomer students' culture celebrated and this has a welcoming and positive impact on the pupils.

St Joseph's College, Belfast

*In the area of teaching and learning the English Department as a whole have developed as reflective practitioners. There is a raised awareness of effective and less effective teaching and learning with a noticeable shift of focus to recognising the importance of the **learning** in the lesson and ensuring that the needs of **all** pupils are met. Lessons are more engaging and there is clear evidence that active teaching strategies are being used and there is greater variety in the nature of questions asked. Effective use of technologies such as iPad is also very evident as a learning tool rather than a teaching tool. There is greater sharing of good practice and this has improved levels of consistency in approaches to teaching and early indicators are that pupils are having similar positive learning experiences.*

Ballyclare Secondary School

Progress was assured where individual teachers and the head of department accepted responsibility for the quality of the teaching and the outcomes attained by the pupils - where teachers reflected on the inextricable link between how well they teach and how well the pupils learn and achieve. In most cases, the teachers had the capacity to move beyond accepting that they were doing a good enough job because they worked hard.

Enablers for improvement

Where improvement was most effective, the learning and teaching:

- was underpinned by a highly attentive dialogue between the teachers and pupils, which resulted in: excellent working relationships, effective questioning leading to deeper understanding and purposeful oral and written feedback;
- allowed for opportunities for pupils to engage with themes and issues that were meaningful, contemporary and promoted enjoyment in the learning;
- was underpinned by the teachers, who had a very good understanding of the A*-C standard at GCSE level and who set tasks that enabled pupils to achieve while engendering pupil self-belief;
- was characterised by creative strategies such as the innovative use of technology and high-quality collaborative learning, including purposeful paired and group work;
- included a clear focus on an awareness of progression in the application of literacy skills, while developing greater knowledge and understanding of language;
- encouraged pupils to take ownership of their learning through, for example, a better understanding of what is expected in order to succeed at KS4, which led to higher pupil aspiration and expectation;
- provided learning that had high levels of challenge, matched with high levels of support and brisk intervention; and
- promoted a wide variety of teaching approaches, such as active learning strategies, which reflected the preferences voiced by the majority of the pupils interviewed by the ETI as part of the programme.

What matters most is what happens in the classroom each and every day where the focus is very much centred on active learning, as opposed to activities and tasks. The learning experiences of our KS4 pupils have undoubtedly been positively impacted...pupils are now engaging fully in the language of learning, of reaching targets and developing and transferring the skills required to meet the assessment criteria. Good teaching is the single most important element in promoting improvement.

Limavady High School

We were keen to build upon the increased engagement and confidence of our students and have moved away from larger after-school revision classes as we're keen to curb this culture of reliance on after-school revision. Instead, we provide revision packs for pupils to complete independently outside lessons and in addition to set homework. Pupils are also invited to attend 'English Clinic' where a teacher is present to support, but pupils are expected to bring their own material or their individual question, rather than simply turning up because a class is scheduled. We have also improved our targeting of individual pupils at risk of failing and group them in smaller workshop-based after-school classes depending on their area of difficulty. This means we are getting the right pupils in front of us at the right time and delivering to meet their needs. This often means that students are not in front of their regular English teacher and so are exposed to a new face who often takes a fresh approach to developing a particular skill.

St Mary's Christian Brothers' Grammar School, Belfast

In English, the most significant actions leading to improvement include active learning at GCSE with a particular focus on boys, the use of pupil voice, speaking and listening with a focus on group discussion, effective questioning and teacher reflection at departmental level. The pupil voice group in years 10 and 11 considered their classroom experience in English and what was effective and enjoyable for them. A key message from their discussions was how useful talking and listening are in the English classroom. Enthusiastic teachers are, according to our pupil voice, central to making lessons enjoyable and fulfilling.

Holy Cross College, Strabane

As the PIEM project draws to a close, the English department feels energised by the number of initiatives it has trialled to raise achievement at GCSE, many of which are now also being embedded at KS3. Visiting other schools, sharing best practice with other departments, establishing a Facebook account and piloting an editing strategy across departments (SPOCK) are just some of the examples of the strategies that have injected a new level of enthusiasm and purpose...

Hazelwood Integrated College, Belfast

Enhancing students' experiences prior to GCSE was a significant step in ensuring students were fully engaged. Departmental meetings became a driver for improving the provision: in years 8 and 9, students were provided with enhanced poetry experiences, while at year 10 dystopian fiction was a focus for improvement. Wider Youth Parliament involvement alongside reading for pleasure, enabling effective pupil voice, optimising extra-curricular opportunities and embedding more extensive use of ICT all contributed positively to the students' experiences. These student-focused initiatives were developed through purposeful use of departmental time, excellent collegial efforts across the department and focused leadership.

St Joseph's College, Belfast

Barriers to improvement

Where progress was less significant, in a minority of cases, the following were contributing barriers:

- the lessons were too teacher directed with insufficient opportunities for the pupils to be engaged actively in the learning;
- there were low-level activities with little challenge which failed to engage the pupils and provide them with opportunities to acquire and develop the skills needed to achieve grades A*-C at GCSE level;
- there was inadequate analysis and application of data to inform significant learning and teaching priorities such as target-setting, differentiation and developing appropriate intervention strategies; and

- there were adverse internal and external issues such as: poor staff or pupil attendance which impinged negatively on progression and continuity in learning; a lack of full parental support or engagement for identified interventions; or the value placed on education within the wider community needed to be strengthened.

4. Leadership and Management

Highly effective leadership and management at all levels are vital to promoting improvement and raising standards for all of the pupils. Schools are prioritising increasingly the need to build leadership capacity at all levels. The key to promoting improvement is the efficacy of the head of department's influence, role and capability. In a small number of the schools in the project, the ETI would have had initial concerns about the capacity of the middle leadership to effect improvement. As the project progressed, with the support of the IAs, the middle leaders developed particular aspects of their leadership and management role. The extent to which this progress extended across all of the schools involved was variable, but all schools showed some measure of improved leadership.

The principal and the senior leadership teams need to consider the development and promotion of literacy and numeracy as priorities, providing the departments sufficient time to engage fully in improvement work; they must also monitor and evaluate more effectively the quality of the provision. This leadership role is crucial to ensuring that the learning and teaching in English, and literacy across the school, translate to better learning experiences and improved standards for the pupils.

Enablers for improvement

Where improvement was most effective, the senior leaders:

- accepted that aspects of the provision needed to improve; all of the nine schools acknowledged the potential benefits of the school's involvement in the PIEM project;
- showed a willingness to engage openly, honestly and effectively with the ETI;
- were pro-active and prepared to work closely with the teachers of English in mentoring, monitoring, supporting and challenging where appropriate;

- provided opportunities for development and preparation through, for example, targeted resourcing, such as allocating time and in-house support to support the improvement work; and,
- were able to build upon effective links between initiatives coming from the PIEM project to existing actions to promote improvement, and created mechanisms for sharing more effective practice.

We have taken on the challenge of examining every aspect of our practice and have put tremendous energy into making changes to improve learning and raise standards. We have worked effectively as a team and we have all appreciated the challenge, guidance and support from the ETI over the last two years.

Belfast Boys' Model School

As a direct consequence of the PIEM process, the head of English has been invited onto our school's core leadership team. As part of this team, the head of department will be tasked with sharing the learning outcomes from her PIEM experience with all other heads of department. She will also be working with the teaching and learning group in leading whole-school staff development exploring some specific strategies that have been developed as part of PIEM. Some of the key strategies being developed across the whole school for the academic year 2015-16 will include: effective questioning, starter activities and effective plenaries. Furthermore, the head of department will lead the whole school in reviewing our whole-school approach to literacy.

Ashfield Boys' High School, Belfast

The PIEM programme has prompted the SLT to reconsider what most effective practice in the classroom actually looks like... The head of English has already shared the conclusions from the pupil voice groups with all staff at a training session in April 2015. He has outlined to all staff how these conclusions are beginning to inform future planning in English. From a whole-school perspective, we will now build on the dissemination of this good practice in the English department across all learning areas. This will start with SLT and middle management meetings in August. Following these key management meetings, the heads of subject will include the key priorities identified by the students, including effective questioning and active learning at KS4, on the agenda for discussion at their departmental meetings... In conclusion, our priority moving forward will be to disseminate at whole-school level the good practice established in the English department as a result of our involvement in PIEM.

Holy Cross College, Strabane

As a whole school we are developing further a culture of sharing good practice within and across departments in an attempt to raise standards continually. Through the actions taken within PIEM and increased departmental time, we now have greater capacity to share good practice in areas such as active classroom walls, use of active learning strategies, greater use of ICT and the developing and embedding of greater consistency of approach in planning and preparation for lessons.

Parkhall Integrated College, Antrim

Leading a literacy agenda in Limavady High School

Clear focus for language across the curriculum - based on staff and pupil need.

- *Staff audit - identified effective teaching strategies to move literacy forward across subjects.*
- *ETI Pupil Voice session - pupils enjoy active learning strategies.*
- *PiE/CAT4 - inferential reading scores are well below the national average.*

Whole staff INSET to address the above:

- *to present staff with a range of teaching strategies to engage pupils (to develop reading for meaning skills in particular); and*
- *provide a generic scheme of work (SoW) cover sheet for all subjects - to highlight relevant baseline information and identify strategies to support progression.*

Follow-up at departmental level: evaluate/adapt SoWs to focus on areas for development - discussion minuted as evidence.

1. *PRSD focus - reading for meaning - all staff to pilot reading strategy and provide evidence eg observation record, details of lessons, pupils' work.*
2. *Follow-up department meeting to share and evaluate strategies (minuted for evidence).*
3. *Further monitoring/evaluation:*
 - *book scoops to provide evidence of reading for meaning at work, sentence and text level - evidence of pupils' questions/responses to text;*
 - *review of SoW cover sheet with other HODs;*
 - *PRSD final review statements;*
 - *PiE/CAT4 assessment results, reading ages; and*
 - *an evaluation of Accelerated Reader, funded through extended schools.*

Limavady High School

Where improvement was most effective, the heads of department:

- were highly effective role models and strong English teachers, who have high expectations and demonstrate tenacity in the pursuit of better learning and teaching and better pupil outcomes;
- were able to communicate high expectations and managed a change agenda that could be articulated clearly, where responsibilities and actions leading to improvement were shared and applied consistently within the department;
- were able to model, and recognise, more effective teaching, together with an ability to share such practice and build further the capacity of colleagues;
- monitored and evaluated closely the impact of learning and teaching on the pupils' outcomes, making changes to the learning and teaching where appropriate; and
- were ready to embrace the required change where it was identified through involvement in the PIEM project and engaged openly, honestly and effectively with the ETI.

Barriers to improvement

In the small number of instances where improvement in leadership was less effective:

- the senior and middle leaders were slow initially to see the PIEM project as an opportunity to add to the overall improvement agenda of the school, as a consequence of issues concerning trust and full acceptance for the school's inclusion in the project;
- a small number of leaders, initially, were not able to articulate the importance of the school's involvement in the PIEM project, with the result that a small number of staff were not convinced of the urgent need to make appropriate changes;
- the ineffective monitoring and evaluation of the provision did not make clear how individual English departments measured up to external and internal comparisons and led to a slowness in dealing with ineffective teaching;
- there was no agreed or shared vision for improvement, so that some teachers failed to accept fully the need for the PIEM support programme and felt that intervention strategies were being imposed from the top down; and
- senior and middle leaders experienced ongoing challenges in resolving staffing issues which impacted adversely on pupils' learning experiences and outcomes, such as attendance, poor performance and low expectations.

5. Outcomes

Promoting improvement in English was successful across all nine schools to varying degrees. The project was tasked with improving GCSE outcomes for pupils at GCSE grades A*-C, while targeting schools where there were higher numbers of FSM pupils.

In seven of the nine schools who received support in English, outcomes in GCSE English improved over the two years of the project; outcomes remained steady in one school and fell in one other.

It should be noted that, in the school where the percentage outcomes at grades A*-C fell between 2013 and 2015, the entry number increased very significantly with the result that three times more FSM pupils achieved at grades A*-C in English in 2015 than in 2013.

Figure 7

The standards attained in GCSE English by all year 12 pupils in the nine participating schools

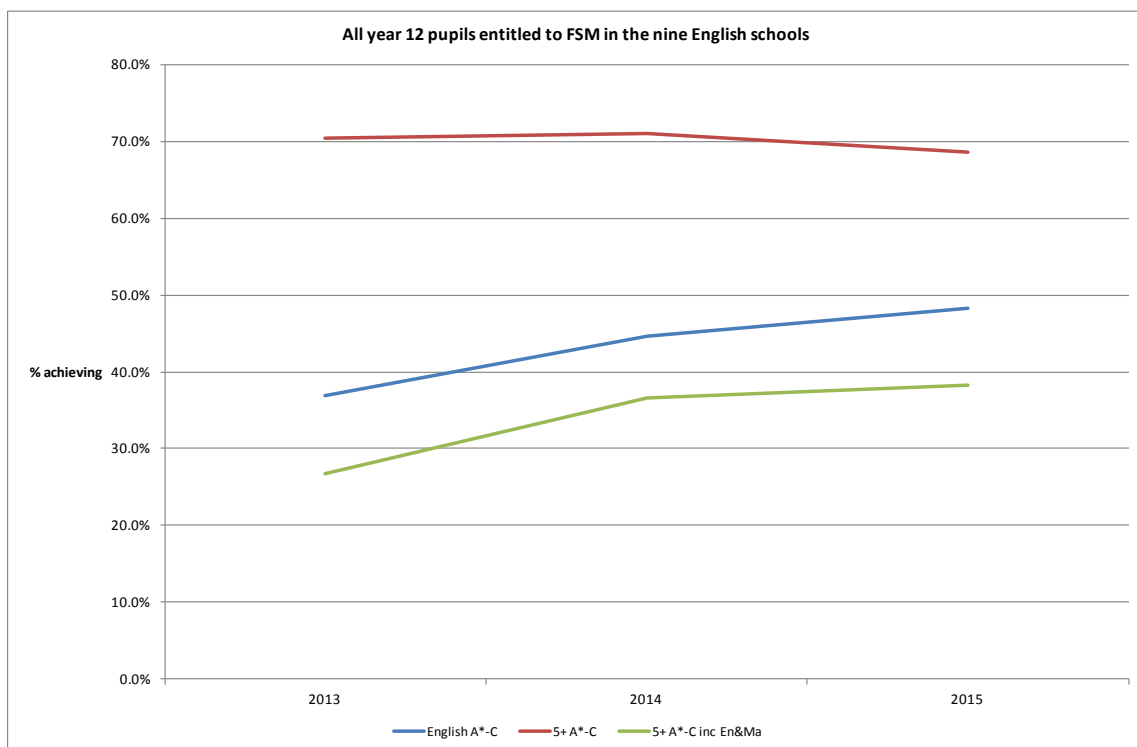
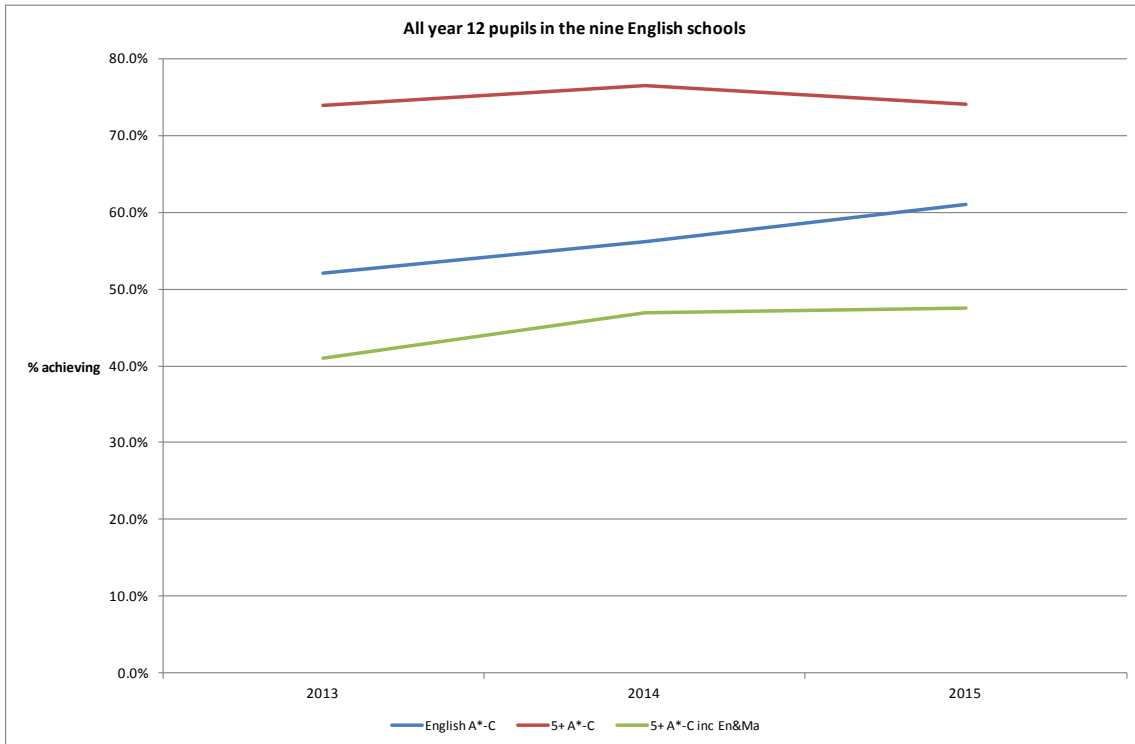


Figure 8

The standards attained in GCSE English by all year 12 FSME pupils in the nine participating schools



The overall increase across all nine schools in the percentage of pupils achieving grades A*-C in GCSE English was 8.9 percentage points, rising from 52.1% to 61.0% (Figure 7).

The improvement for the FSME pupils was even more marked, rising by almost 11.3 percentage points from 36.9% to 48.2% (Figure 8).

In all nine schools, on average, a comparison of the improvement in English over three years was not matched by similar improvement in the percentage of pupils achieving five or more GCSE grades at A*-C and in five or more GCSE grades at A*-C, including GCSE English and GCSE mathematics. It remains to be seen if this pattern is replicated in all schools or whether it is specific to the nine schools involved in the PIEM project.

Annex B: Mathematics

For young people to become well-informed, active members of society, and to be able to contribute positively to the economy, they need to acquire appropriate mathematical knowledge, understanding and skills. Research shows that poor basic mathematical skills have an adverse effect on a person's life and lead to significant disadvantage for the individual in the labour market and in society generally. Increasingly jobs require workers to be able to solve problems within mathematically-rich situations.

The ten schools that were selected to receive support in mathematics needed to improve their mathematics provision so that more of their pupils would gain the necessary core knowledge, understanding and skills, alongside the confidence and competence to apply these skills in familiar and unfamiliar settings.

In line with the English section, this mathematics section is arranged in four parts:

engagement with process; planning; learning and teaching; and leadership and management. Within each of these sections, enablers for improvement and barriers to improvement are identified.

1. Engagement with process

Enablers for improvement

In those schools where a strong collegiality existed in the mathematics department, the head of department and teachers took on board the evaluations from the baseline visit, accepted the need for improvement and worked collectively to improve the quality of provision and the overall standards the pupils achieve.

Prior to our involvement with PIEM, the mathematics GCSE results were low, as was the morale of the department. Attendance of staff was excellent, staff were capable and hardworking, behaviour of pupils was not an issue, yet pupils continued to underachieve. Reflecting on the situation at the time, several points emerge. Any interventions seemed to be aimed at a 'quick fix' for year 12, rather than taking time to identify the real essence of the issue. We also became aware of our tendency towards traditional methods of teaching. The baseline visit, although approached with trepidation, actually boosted our confidence as many positive areas were highlighted. Of course, we are by no means perfect and so through discussions with the ETI, we decided upon our focus areas to effect improvements in results.

Belfast Model School for Girls

We have travelled a long way down the road to our ultimate goal; to build coherent and effective classroom practice from KS3 and beyond, to challenge our most able pupils and to remove barriers to learning for our pupils with additional needs. We also focus on assessment of and for learning, for each and every one of our pupils. Our disappointment, that these positive changes were not as deeply embedded across the department as believed, makes us more determined going forward that, by ensuring we have more robust systems in place and all members of the department buy into our new approach, all of our pupils will experience a fuller, more consistent and, above all, a more productive mathematical education.

Lismore Comprehensive College, Craigavon

We believe that being invited to join the PIEM programme was a continuation of a journey towards raising standards and tackling underachievement that had already begun. It did, however, add momentum and focus to the mathematics department, challenging us both at a departmental and whole-school level to maximise the pupils' full potential. With a younger, energetic department there was an acceptance of 'we must do better' and a realisation that we needed a supportive staff, not only within the mathematics department, but throughout the school if we were to make progress.

St Mary's College, Derry

Barriers to improvement

In three of the schools, the departments were slow to engage with the process. Significant barriers to engagement included the teachers' belief that underachievement in mathematics was a consequence of the social and educational context of the pupils and a view that the pupils were of low ability and unable to achieve higher outcomes. In these departments, the teachers felt strongly that there was no need to change their practice.

Low levels of engagement also existed among teachers in departments where working relationships were strained, morale was low and there was a negative atmosphere.

In two of the schools where the position of head of department was vacant for extended periods of time, a lack of stability in leadership impacted negatively on the level of engagement and pace of improvement. In another school, where the head of department was absent, the acting head of department effectively led improvements by raising the level of engagement of the department with PIEM.

2. Planning

The *Best Practice in English and Mathematics*⁹ report highlighted that well-planned progression in the schemes of work is linked strongly to high expectations, which in turn is central to successful departments.

9 <http://tinyurl.com/Best-Practice-En-Ma-PP-Schools>

Enablers for improvement

At varying stages of the programme, all of the schools acted, to a lesser or greater degree, on the recommendations made during the baseline visits to improve progression in the pupil's learning. As a result of the improved links with feeder primary schools, six of the departments have reviewed and revised the year 8 planning in order to build more effectively on the experiences and learning of the pupils when they were in year 7.

As a full-service extended school¹⁰, we have two transition teachers who teach both in the Girls' Model and in a number of our feeder primary schools. The mathematics department liaises every few years with the KS2 co-ordinators of our main feeder schools and revise our KS3 schemes, taking cognisance of mathematical concepts where difficulty was experienced by the primary pupils. A scheme of work is a constantly evolving working document and next year, funded by North Belfast Area Learning Community, we will be working with the co-ordinators in our main feeders to develop a year 7/year 8 scheme of work with well-planned progression which should identify overlap, ensure coherence and address any regression experienced over the summer break.

Belfast Model School for Girls

We believe that pupil achievement in mathematics is dependent on access to high quality teaching and learning at all stages of the educational journey and that there is a need for joint professional development with our partner primary schools. Some very effective work has already started between the schools. Numeracy co-ordinators have carried out shared lessons which have been very effective in developing expertise across both the primary and post-primary sectors. We have agreed to implement joint staff training. Staff from all schools participated in training in August which targeted underachievement in boys and a member of staff from all schools has been trained in maths recovery which is very useful for supporting children who are failing to grasp number. Maths Recovery can also be used to develop number knowledge and strategies through an individualised intervention programme.

St Colm's High School, Belfast

¹⁰ The DE funds two Full Service Programmes under governance arrangements, and through project boards, with the previously Belfast Education and Library Board (BELB) and the Council for Catholic Maintained Schools (CCMS). These programmes seek to enhance the life chances of young people by ensuring improved educational attainment through addressing the real and specific needs of learners, their families and the local communities. One of these two programmes is the Full Service Extended Schools, located at the Belfast Boys' Model School and the Belfast Model School for Girls, with a project board managed by the Education Authority.

We have revisited the transition project we initiated some years ago with two key feeder primary schools. This work seeks to understand and build on the mathematical experience of pupils prior to joining year 8 and then to address those areas of difficulty for transferring pupils. We are excited about further research and sharing across these key stages, which will provide a significant opportunity to intervene positively in the mathematical journey of young people.

Oakgrove Integrated College, Londonderry

In six of the schools where the quality of planning improved significantly, the teachers worked together and shared responsibility for the review, development and further refinement of the schemes of work. On these occasions, the review led to a reduction in the amount of duplication and repetition in the original planning.

A key feature in the improved planning is the focus on learning that provides appropriate challenge, taking account of the ability profile of the pupils.

A collegial approach is essential to planning, and schemes at KS3 were reviewed and modified to include active learning strategies, differentiation and common assessment tasks. Schemes now offer 'stretch' to all pupils. As a result of the introduction of a whole-school tracker and the recording of three common task outcomes, teachers were able to identify underachievement and under-performance and were better informed in planning lessons for improvement.

Bangor Academy and Sixth Form College

Our schemes are designed with clear challenge focused on differentiation and progression within mathematics. The schemes of work integrate pedagogical concepts and are reviewed on an ongoing basis. The following documentation is in place: student learning and assessment calendars; student topic models; concept maps at KS3; schemes of work at all key stages which allow for stretch, challenge and differentiation.

St Louise's Comprehensive College, Belfast

Never a department to tackle things half-heartedly, we embarked on a massive task to source, produce and categorise good quality appropriate, useful 'hands on' activities to link with both our KS3 and KS4 schemes of work. We are fortunate to have a good size mathematics store where each activity was catalogued and stored in a 'blue box'. These, along with power points, worksheets, interactive resources, iPad activities, QR (quick response) codes, numeracy workout links and text book pages were included in the schemes of work activity planners.

Belfast Model School for Girls

Barriers to improvement

Where there has been little improvement in the quality of the planning, a key issue was the teachers' low expectation of what the pupils can achieve. This low expectation often resulted in pupils being entered for a combination of GCSE papers which limits the maximum grade they can attain and lowers the pupils' aspirations in mathematics. At KS4, a further barrier to improving the quality of the learning and teaching was the planning being based solely on the content outlined in the GCSE specification or the accompanying generic scheme of work.

Planning that does not ensure appropriate progression is a major barrier that needs to be overcome if there is to be improvement in the pupils' achievements. An important aspect of this is the lack of progression from year 7 to year 8. The ETI interviewed 60 year 11 pupils across all of the schools towards the end of the project; when asked to reflect on their experiences in year 8 mathematics lessons, most highlighted the repetition of KS2 work and the lack of new learning as a negative experience.

3. Learning and Teaching

The characteristics of effective learning and teaching are well established (as highlighted in Better Mathematics¹¹), and are in place when teachers:

- share the intended learning with the pupils at the start of the lesson;
- recap and link the work to previous learning, or set the work in an appropriate real-world context;

11 <http://tinyurl.com/Better-Maths-Eval-Prompts-PP>

- provide clear exposition involving, where appropriate, multiple explanations, with board-work modelling what the pupils should do;
- use a variety of activities, including ICT and practical equipment, which entails the pupils working individually, in pairs or in groups;
- provide opportunities for the pupils to solve problems;
- integrate, when appropriate, the use of effective mental mathematics strategies;
- use skilful questioning, challenging the pupils' understanding and requiring them to draw conclusions and justify their thinking;
- highlight common misconceptions and exploit these in a sensitive way;
- relate the ongoing work to other parts of the course in order to encourage the pupils to make interconnections and think of mathematics holistically;
- engage the pupils fully by ensuring that the lesson had appropriate pace, challenge and progression;
- teach step-by-step algorithms only when necessary; and
- encourage the pupils to think and talk about how they learn and what they have learnt, often through appropriate plenary sessions at the end of lessons.

These characteristics mirrored strongly the views of the 60 year 11 pupils, who met with inspectors, when they were asked to describe a good lesson.

Enablers for improvement

In eight of the departments there was at least one very effective teacher whose practice reflected consistently the characteristics listed above. This formed a basis from which six of the departments effectively shared good practice and improved the overall quality of teaching and learning. Most importantly, in these schools there is now a higher probability that a pupil will experience rich and challenging learning in mathematics and achieve standards commensurate with their ability. During the project, when classroom practice improved and was aligned more closely to the characteristics above, the key enablers for improvement were the:

- teachers' raised expectations;
- teachers' enthusiasm for, and enjoyment of, their work;

- mutual respect between the teachers and pupils;
- teachers' recognition of the pupils' efforts, rather than solely their attainment; and
- teachers' development of a 'can do' ethos, the pupils' confidence to 'have a go' and their resilience.

Discussions with the pupils at the beginning and the end of the programme confirm that they value and respond positively to these enablers.

Towards improving the quality of learning and teaching and raising attainment, our aims were to: improve pupils' confidence and self-esteem; create a visually stimulating and effective learning environment in mathematics classrooms; provide meaningful assessment opportunities; and give targeted pupil feedback. The effective use of plenary sessions and the learning environment within the classroom were identified at our baseline visit as areas which we could improve. The learning environment within the classroom was improved by: promoting practical and group work; showcasing pupil work; displaying differentiated work in the classroom; producing career displays and conducting Maths Challenges with year 8.

Bangor Academy and Sixth Form College

Our journey developed over the two years, focusing on five main areas. First, we decided that a more active learning approach needed to be fully incorporated into our lessons in order to enrich our pupils' learning experiences. The positive impact of this change was twofold: there was increased motivation among members of the department to engage in active learning activities; and, the pupils enjoyed participating.

This led us into our second area of focus - effective questioning. We concluded that the best way forward was to incorporate effective questions within the activities. The pupils were encouraged to think through, explain and present their solutions to the activities.

Our third focus concentrated on a review and edit of our homework and feedback policy. More emphasis was put on their corrections and further examples given to support understanding. The use of visualisers to illustrate examples of good practice and provide feedback to the class as a whole through the teacher's marking of pupils' books was very useful.

Raising the profile of mathematics was our fourth area of focus. Department notice boards were updated to be more effective, humorous mathematical quotations

were displayed throughout the department, interactive displays including Twitter boards were developed, past pupil profiles were displayed, competitions took place each half term and a year 8 numeracy trail around the school was developed. We also took part in Maths World Day and Number Day.

Our fifth focus was really just a continuation of what already existed with regards to year 12 GCSE examination preparation, for example, homework club on three afternoons, and a revision day involving the entire department prior to each paper to facilitate final examination preparation. In addition, we encouraged pupils to think independently and prompted them to produce their own revision summaries which, when checked, are uploaded to the school's virtual learning environment (VLE). The Girls' Model VLE has an abundance of mathematics revision resources including powerpoints and practice materials such as Numeracy Workout for both key stages. Teachers make regular use of ICT to enhance classroom teaching and reinforce learning.

Belfast Model School for Girls

Various strategies were adopted as a result of our inclusion in PIEM. For example, 'show me' boards were introduced to allow the teacher to get an immediate response from pupils, so that misconceptions and common errors were addressed; visualisers were purchased to aid learning; Accelerated Maths and subsequent interventions were used as our main programme for individual support; and classroom wall displays were used more effectively by our pupils to provide teachers with feedback on their learning.

St Colm's High School, Belfast

Our primary focus was the provision of lessons which would enhance the learning of the pupils, particularly through the development of their oral skills. We used lessons based on the 'Thinking Maths' concepts of valuing all pupils' inputs and giving pupils time to frame, explain and share their thinking. We took account of the lessons using Malcolm Swann's 'Improving Learning in Mathematics' (ILiM) material and developed activities of a similar nature - matching cards, true/false statements, sometimes/always/never activities and so on. These lessons were complemented by the use of MyMaths which also encompassed such activities. The innovative developments using iPad technology as an accelerator of learning were evident in the majority of classrooms. Assessment for learning remains a key driver in our whole-school action plan for improvement. As a department we addressed issues found in homeworks with a concentration on student learning points (LPs) and action points (APs). Teachers highlight LPs and subsequently students take action to address these points - corrections, extra examples, other questions or notes from sites such as MyMaths. The students are being encouraged to use APs in a variety of ways, allowing them to address errors in their work. The good practice observed during book looks in November 2013 and 2014 were collated, produced and distributed in booklets of good practice: marking procedures, corrections, good formative feedback, variety in tasks, addressing misconceptions in APs, target setting, self-assessments and, most importantly, praise, encouragement and rewards.

St Louise's Comprehensive College, Belfast

Some of the more significant strategies which we developed further through our involvement in the PIEM programme included extending the number of teaching strategies. This has been facilitated through departmental meetings, through an open-door policy (where teachers 'buddy up' and observe each other) and through integrating these strategies into a new scheme of work. Teachers are learning from each other, there is more sharing of resources, pupils are more engaged and, as a result, we are seeing results improve. We also revisited the area of questioning, which on a previous ETI visit had been mentioned as an area for improvement. Through the use of ILiM materials there is greater awareness of effective and less effective questioning and we focus on these during classroom observations. The importance of having a good team of teachers willing to help each other and share resources cannot be underestimated.

St Mary's College, Derry

Following our involvement in PIEM, the emphasis has shifted from teacher talk to pupil learning. More engaging and active teaching strategies are being used and there is greater variety in the nature of questions asked. We are using more collaborative activities and problem-solving approaches in which learners are challenged and arrive at understanding through discussion rather than rote learning. We plan to develop further our planning for the pupils' learning experiences.

St Patrick's College, Ballymena

While accepting that the quality of learning and teaching should be high in all year groups and at all times, ensuring that pupils are well-prepared for their public examinations is very important and highly valued by pupils and parents. Prior to their involvement with the project, the schools were using a range of short-term strategies for examination preparation, typically additional revision classes. As a result of the advice and guidance from the inspectors and the IA, the departments broadened the range of strategies by:

- sharing ideas at the heads of department cluster meetings;
- accessing revision resources on Fronter; and
- making detailed use of examination analysis software to target support.

In KS4, we were traditional in our use of past papers and their mark schemes reflecting the thoughts of Paul Halmos - "The only way to learn mathematics is to do mathematics". As a result of our involvement in PIEM, we supplemented the past papers with topic booklets of past paper questions produced by the exam board. We analysed the previous year's results using the awarding organisation's exam results analysis facility and this allowed us to produce our 'sticky bits' resource which focused on topics/questions in which our students had performed below the exam board average. The questions were accompanied by the chief examiner's relevant commentary and advice and by the mark scheme for the question. Further questions of a similar nature were provided as practice for the students. The school also provided assistance in the form of a Saturday school - allowing pupils to "do mathematics" without their class teacher, but with guidance from mathematics specialists. There was also the provision by teachers from the mathematics department of after-school or lunch time classes on a regular basis. The continuous focus on student tracking at individual, group, department and whole-school level allowed for personalised action plans for mathematics to be drawn up in partnership with students and shared with parents.

St Louise's Comprehensive College, Belfast

In March 2015 all Year 12 pupils were given a mock GCSE exam. These papers were rigorously analysed, a spreadsheet created to identify specific and individual target areas and letters sent home to inform parents and pupils of areas where improvement was needed, along with strategies that could be used to effect improvement. In April 2015, all year 12 pupils participated in a revision session on exam technique and a practice session was carried out on how to complete AO3 style open-ended questions. We recognise the importance of pupil feedback, rigorous planning, working together and self-evaluation through the analysis of data and classroom practice.

Bangor Academy and Sixth Form College

Barriers to improvement

During the baseline visits, the learning and teaching in 45% of the lessons observed were not good enough. During the programme a small number of teachers did not engage with, and benefit from, the support and guidance provided and so improve their practice.

Evidence gained from observing lessons, looking at pupils' work and listening to them confirms that the barriers to improvement include too many lessons in which the pupils:

- had the perception that the teachers were not committed;
- felt that they could not ask for help;
- were silent and mostly worked individually at completing repetitive exercises;
- were idle when they had completed the set work;
- did not receive feedback on how well they were doing and their work was not regularly monitored; and
- had resigned themselves to having to access help from external tutors.

A major finding of the mathematics section of the *Best Practice in English and Mathematics*¹² report was that teachers need to monitor regularly the pupils' work, provide timely and appropriately detailed feedback and support, and follow up on any corrections, giving praise and further help when needed.

During the baseline visits, these three important aspects were identified as areas for development in most of the schools. Inspectors and the IA supported the heads of department in leading department meetings to evaluate:

- the breadth and challenge of the pupils' written work;
- the extent to which the teachers monitor and follow through on the pupils' self-marking; and
- the quality and frequency of feedback provided by the teachers to the pupils.

¹² <http://tinyurl.com/Better-Maths-Eval-Prompts-PP>

While there has been significant improvement in five of the departments in the project, there is still too much variation in how well teachers have adopted more effective practices on marking and assessment. To overcome this barrier, the heads of department need to monitor more rigorously and challenge inconsistencies in practice.

4. Leadership and management

The *Follow-up to Better Mathematics*¹³ report highlighted that the head of the mathematics department needs to lead his or her departmental team with commitment, ensuring that the teachers collaborate effectively to:

- reach a shared understanding of what is the most effective mathematics pedagogy¹⁴;
- produce a scheme of work that is a working document and acts as a repository of best practice, provides guidance for each teacher to plan his or her individual, or series of, lessons and ensures coherence and progression in the pupils' learning;
- promote and disseminate best practice within the team through open, inclusive discussions at regular, well-planned meetings;
- propose and implement actions, identified through individual and team self-evaluation and taking cognisance of whole-school issues, to improve the pedagogy and the standards the pupils achieve; and
- review the above actions in light of discernible improvement, identified through rigorous monitoring and evaluation, including the use of performance data.

These characteristics mirror closely similar requirement in paragraph 4.24 of Count. Read: Succeed¹⁵.

13 <http://tinyurl.com/Follow-up-Better-Maths-2006-10>

14 <http://tinyurl.com/Second-Report-Better-Maths-PP>

15 <http://tinyurl.com/count-read-succeed-strategy>

Enablers for improvement

The leadership of mathematics has improved in seven of the schools. Where the departments have improved during the two years of the project, the heads of department developed their leadership capacity, and, to a lesser or greater degree, they:

- hold high expectations for the both teachers and pupils;
- lead the departmental team with commitment, energy and enthusiasm;
- ensure that the teachers collaborate effectively to propose and implement actions to bring about improvement;
- monitor and evaluate rigorously the provision for learning and the standards achieved by the pupils;
- make full and effective use of internal and external performance data; and,
- challenge ineffective practice.

Over the last four years several whole-school strategies have been introduced through our school development plan to help raise standards, for example, pupil tracking and target setting, using a wide range of data to support teaching and learning, the introduction of parenting programmes, and a programme that links each head of department with the senior leadership team. In addition, a number of significant actions have taken place, which has raised the profile and achievement in mathematics. PIEM supported the subject leader in developing a reflective department with learning and teaching central to all it does. The support and advice from the ETI and the IA have provided challenges, as well as opportunities to see good practice, and have helped the head of department implement measures to raise standards in mathematics.

Brownlow Integrated College, Craigavon

To monitor our own provision we have carried out peer observations, we have begun to do book looks and we have produced a booklet of good practice in the use of our journals. Progress has been made. For example, in 2014 and for the first time, standardised baseline data showed KS3 mathematics as having higher value-added scores than English or science, and mathematics GCSE results in 2014 were higher than they have ever been. However, there is much work still to do in ensuring that the head of department is giving the correct balance of support and challenge in providing consistent, high-quality teaching and learning across the whole department.

Glastry College, Newtownards

Participating in PIEM has given us a tremendous opportunity for capacity building, not only for the head of mathematics but also for other heads of department and curriculum leaders. The head of mathematics has developed a deeper understanding of her role in leading high-quality teaching and learning and making all staff within her department accountable for standards of achievement. The mathematics action plan has been shared with other departments as an example of good practice and all departments have adopted this structure which sets out clear baseline data and expected outcomes.

St Colm's High School, Belfast

In all of the schools, the senior leaders supported the head of department through meeting regularly with them and providing the department with additional resources. In one-half of the schools, where the improvement was most notable, the senior leaders provided continuous encouragement, guidance, support and challenge, resulting in the heads of department and teachers growing in enthusiasm and confidence and contributing to whole-school staff development.

Continuous monitoring and evaluation is necessary when implementing any change in order to make adjustments and required improvements as well as providing evidence of success. Over the two years we carried out this process in a variety of ways, including: peer observations, open discussion informally and in department meetings, pupil surveys, pupil evaluations through use of Twitter boards, book looks, activity and effective questioning looks, and ETI visits. We believe that we have worked successfully and have addressed the challenges we faced in order to raise standards. During each of the two years of our involvement in the programme, our percentage of GCSE grades C and above have risen and our strategies for improvement, as outlined in this report, have been embedded so that improvement will be sustained. We have been given a lot of support and encouragement during this year from both of our acting principals, as well as our senior leadership team. We really appreciate this support and feel confident that we can continue our journey when the programme concludes.

Belfast Model School for Girls

To develop the role of the head of department, a multi-strand approach was adopted, with direct support provided for the acting heads of department by the principal and senior link teacher on a scheduled fortnightly basis, ongoing support with the senior link teacher, meetings with the mathematics subgroup of the board of governors and regular updates communicated to the full board. Furthermore, additional resources to enable active learning, mathematics games and problem-solving activities were purchased and further investment in ICT resources for the Department was provided. Pupil work was presented to the senior leadership team with feedback communicated to the department identifying strengths and areas for development. The principal and vice-principals observed classes and provided valuable feedback to individual teachers - this initiative was then rolled out across the rest of the school. To tackle inconsistencies in the teaching of mathematics, we developed new, more rigorous, approaches to homework and marking and are currently re-developing our schemes in a common format, which include clearly defined levels of differentiation.

Lismore Comprehensive College, Craigavon

One of our school development plan (SDP) priorities is to encourage greater collaborative working between the English and mathematics departments. We have allocated time for both heads of departments to meet on a weekly basis to allow more opportunity to discuss progress of individual pupils, to share good classroom practice, to plan joint staff training and to set targets for GCSE in year 10. Early on in the process, we could see that the strategies the mathematics department were focussing on were equally important at whole-school level. Consequently, we decided to prioritise the development of effective questioning in the classroom in our SDP. We carried out a self-evaluation exercise and delivered staff training which was led by the literacy co-ordinator. It was clear that the mathematics department was delivering some outstanding practice which needed to be shared with other departments. Effective questioning in the classroom has been the focus of PRSD this year.

St Colm's High School, Belfast

Having moved to a brand new state-of-the-art campus in 2010 and with several new teachers joining the mathematics department, the senior management team gave us their full support, not only financially by providing resources, but also by adopting a 'we will' approach to improving the mathematics results and raising the department's profile at whole-school level. The practice of using data to produce predicted and target grades and analysing the accuracy of target-setting used in the mathematics department has been fed into processes across all departments in the school at KS4 during 2014-15. The lessons learned shaped the current procedures for tracking all GCSE subjects and this process is to be further enhanced in 2015-16. One of our key priorities at whole-school level is improving learning and teaching; the mathematics department is now in a position to take the lead on this and share their good classroom practice with other staff to raise standards at whole-school level.

St Mary's College, Derry

When evaluating the impact of actions to effect improvement, an essential source of evidence is the pupils' views on the changes to their learning experiences.

The following was noted: pupils' positivity in terms of their lessons and teachers; pupils experience a variety of lesson starters; pupils are aware of their targets, LPs and APs; with a heightened sense of community, pupils are aware that they learn from each other and see this as something positive; pupils know and are clear about what they have been learning and all pupils are highly aspirational.

St Louise's Comprehensive College, Belfast

This focused use of pupil voice has included the creation of questionnaires devised with pupils and trialled by teachers working in pairs, with feedback to colleagues in departmental meeting time.

Oakgrove Integrated College, Londonderry

Barriers to improvement

The greatest barrier to improvement was the capacity of the head of department to lead and manage his or her team effectively. This mirrors the overall inspection findings since 2006 which identify the need to improve the leadership and management of post-primary mathematics. Even when most of the members of a department had accepted the recommendations from the baseline visits, the head of department had to instigate and follow through on changes - changes that were sometimes at odds with the thinking of reluctant members of their department. During the programme, two of the heads of department relinquished their leadership responsibility.

Even when departments were given additional time to meet and used it effectively, another barrier to improvement arose: namely, the failure to move from talking about new teaching strategies and resources to integrating these into classroom practice. In taking this step, the willingness of the head of department to 'lead from the front' and be the 'first-adopter' is crucial. In some departments, the difficulty for all those who teach mathematics, including non-specialists and part-time specialists, to attend the departmental meetings is a barrier to improvement. However, during the second year of the programme, this barrier was reduced significantly in all of the departments.

The evidence from the project confirms that poor working relationships between the senior leaders and the mathematics department, and particularly the head of department, are a potential barrier to improvement. When the senior leaders provide

support and challenge, it is more likely that the head of department will lead and manage effectively. When the senior leaders do not exercise the challenge function, there is a greater probability that the mathematics department settles into a comfort zone, where they continue to do what they have always done and continue to place the reasons for under-achievement solely on such external factors as the attitude and ability of the pupils and the levels of social deprivation.

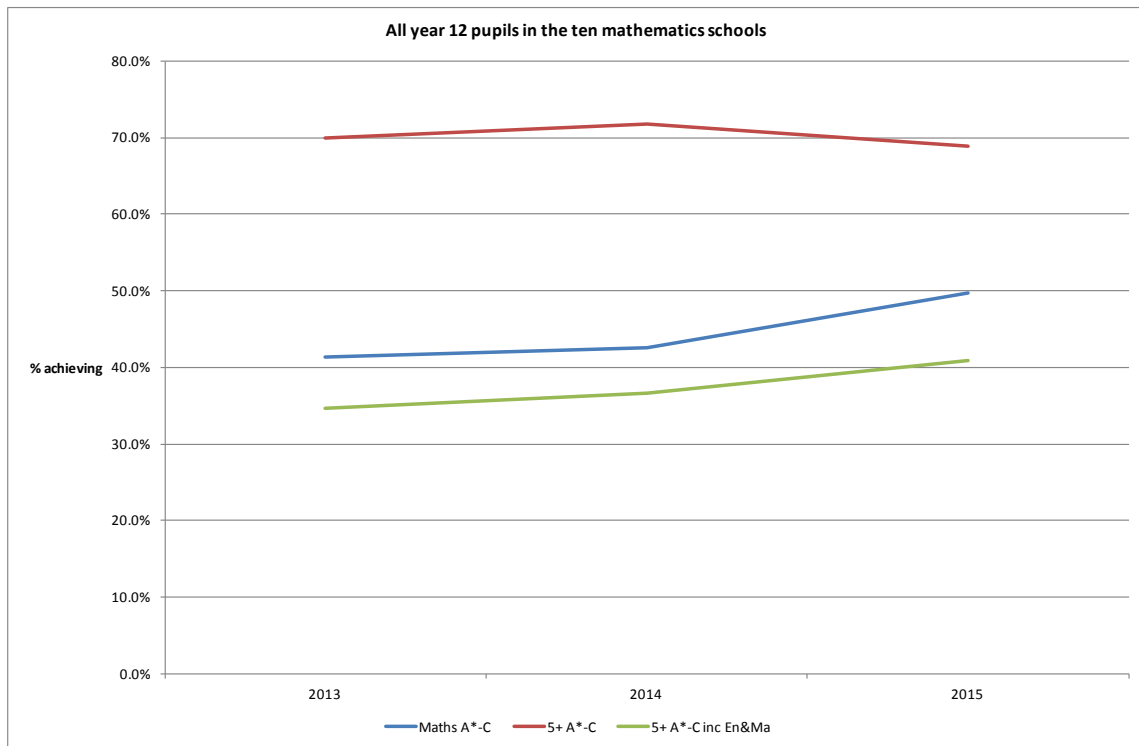
5. Outcomes

During the two-year period of the PIEM project, the ten mathematics departments gained much by being in the PIEM project. As a result, there has been overall improvement across the ten schools. Given that there was evidence of underachievement in each of the schools when they were selected to enter the project, the following improvements are noteworthy.

- The overall quality of learning and teaching improved in seven.
- The attainment at GCSE improved in eight, with a marked improvement in five.
- The overall standards in mathematics, including the quality of the pupils' written work, their levels of confidence and their oral responses, improved in six.
- The leadership of mathematics improved in seven.

Figure 9

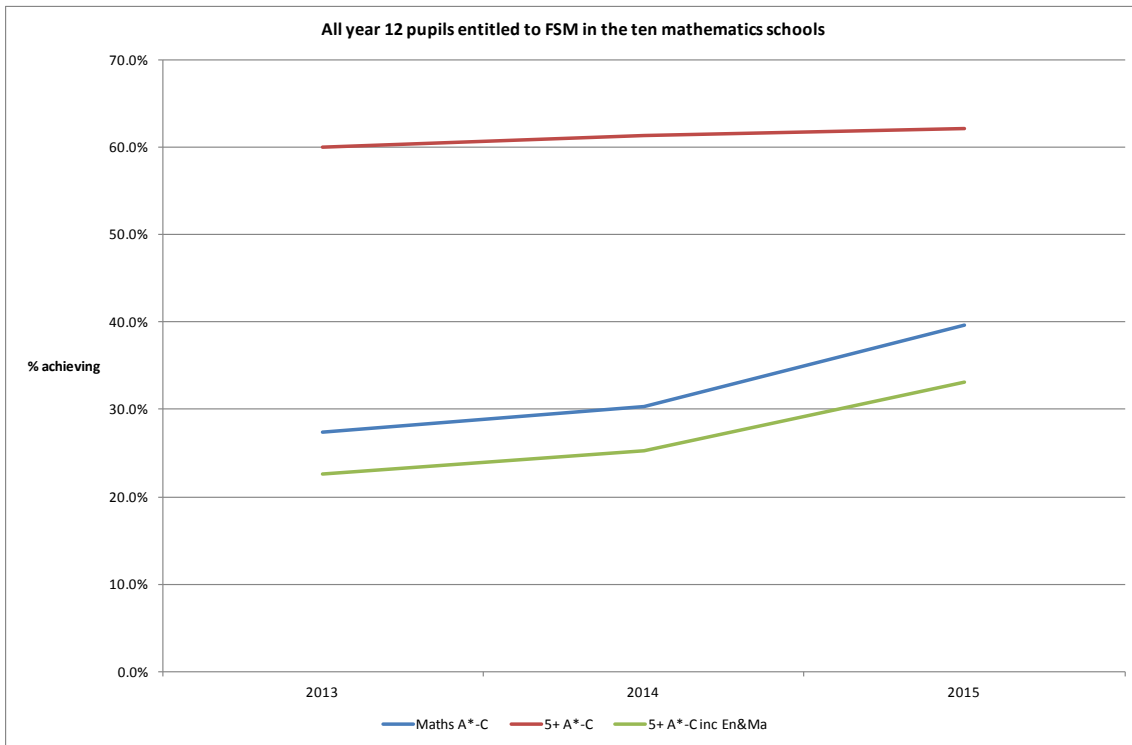
The standards attained in GCSE mathematics by all year 12 pupils in the 10 participating schools



The overall increase across all ten schools in the percentage of pupils achieving grades A*-C in GCSE mathematics was almost 8.4 percentage points, rising from 41.3% to 49.7% (Figure 9).

Figure 10

The standards attained in GCSE mathematics by all year 12 FSME pupils in the 10 participating schools



The improvement for the FSME pupils was even more marked, rising by almost 12.3 percentage points from 27.4% to 39.7% (Figure 10).

In all ten schools, on average, a comparison of the improvement in mathematics over three years was not matched by similar improvement in the percentage of pupils achieving five or more GCSE grades at A*-C and in five or more GCSE grades at A*-C, including GCSE English and GCSE mathematics. It remains to be seen if this is replicated in all schools or whether it is specific to the ten schools involved in the PIEM project.

As a result of PIEM, overall, a greater proportion of the pupils within these schools are now benefiting from richer learning experiences and improved standards, and achieve higher levels of attainment in mathematics which are more commensurate with their ability.

The schools received support and guidance from the inspectors and the IA. They also benefitted from the opportunities to learn from the other departments and mathematics is now given a higher priority within these schools.

Enablers for Improvement

The key enablers for improvement were:

- teachers engaged with the change process in the best interests of the pupils;
- heads of department took responsibility for improving the quality of learning and teaching, challenging and following through on ineffective classroom practice;
- through high quality professional discussion and debate, department meetings were used to reach a shared understanding of what constitutes effective learning and teaching of mathematics;
- teachers raised their expectations for what pupils of all ability can achieve in mathematics;
- mathematical learning was engaging, set in meaningful contexts and allowed the pupils to explore, reason, solve problems and explain their understanding to their peers;
- teachers improved their planning for appropriate progression in learning which included the necessary focus on differentiated activities matched to the ability profile of the pupils;
- there was a stronger collegiality amongst the teachers in the mathematics department, along with greater enthusiasm for, and engagement in, the opportunities for professional development made available through the PIEM project; and,
- teachers provided effective, targeted support at an individual pupil level which is informed by assessment of the pupils' learning, including the analysis of internal and external performance data.

Barriers to improvement

The project also identified barriers that schools in similar situations may have to overcome, to a lesser or greater degree, to bring (or effect) similar improvement.

Three main factors underscore these barriers and were found to militate against improvement. That is:

- the failure of leadership at all levels to challenge and follow through on poor classroom practice;
- the low expectations held by teachers and the acceptance of these by leadership; and
- the reluctance of teachers to improve their practice in light of the changing needs of their pupils and the demands of a rapidly changing society.

Appendix: The participating schools

Annex A - English:

- Ashfield Boys' High School, Belfast
- Ballyclare Secondary School
- Belfast Boys' Model School
- Hazelwood Integrated College, Belfast
- Holy Cross College, Strabane
- Limavady High School
- Parkhall Integrated College, Antrim
- St Joseph's College, Belfast
- St Mary's Christian Brothers' Grammar School, Belfast

Annex B - Mathematics:

- Bangor Academy and Sixth Form College
- Belfast Model School for Girls
- Brownlow Integrated College, Craigavon
- Glastry College, Newtownards
- Lismore Comprehensive College, Belfast
- Oakgrove Integrated College, Londonderry
- St Colm's High School, Belfast
- St Louise's Comprehensive College, Belfast
- St Mary's College, Derry
- St Patrick's College, Ballymena

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