



CASE STUDY REPORT

Big improvements in maths GCSE attainment without specialists

Tim Mason

This study was originally published in 2010 as part of the 'What Works Well' initiative, part of the National Strategies for Education in England.

Abstract

Background: The purpose of the study was to improve mathematics results in a school by improving teaching and assessment, and increasing pupil engagement and aspirations.

Aims: The main aim was to improve maths results and engagement by providing strong leadership and teachers, and using CPD and resources to raise pupils' aspirations and engagement.

Methods: The participants included middle leaders, senior leadership team, subject leaders, teachers, local authority staff, and pupils. They worked together to improve maths results, with CPD approaches such as modelling, coaching, and work scrutiny. CPD approaches included modelling of good practice, coaching, tracking and monitoring, work scrutiny, and specific training sessions. Resources were based on the Standards Unit Box 'Improving Teaching and Learning in Mathematics'. Support was provided by LA consultants and specialist help.

Findings: The main findings are that pupil attitudes towards maths have improved, GCSE results have exceeded the school target, teaching quality has increased, and pupils are more confident in their learning.

Implications: The findings suggest that strong leadership and teachers, along with external subject expertise, are essential for successful maths interventions. This has resulted in improved teaching, increased confidence in school leadership, and better recruitment and tracking of students.

This abstract was generated by Camtree using a large language model (LLM) and added to the original report in 2023.

Keywords: Secondary education; Mathematics

Introduction

What were your reasons for doing this type of development work?

Attainment overall in the School had improved considerably, but the maths results had stayed low, and kept the school in the National Challenge category. Recruitment to maths posts had been problematical for some time. Many groups were taught by long term supply staff and pupils had come to have very low expectations from maths classes.

Who might find this case study useful?

- Middle leader
- Senior leadership team (SLT)
- Subject leader
- Teacher

Description

What specific curriculum area, subject or aspect did you intend to have impact on?

- Mathematics

How did you intend to impact on pupil learning?

We intended to improve all aspects of learning. During their time at the school, the pupils' experience of maths had been largely unsatisfactory, and there was a lot of disaffection. Many saw their maths targets as unachievable, and given the levels of attainment of their predecessors this was a reasonable view for them to take. Through improved teaching and good AfL systems, it was hoped to raise the aspirations and engagement of the pupils so that their learning in maths matched their learning in other subjects.

What were your success criteria?

- Improved GCSE results in maths, resulting in the '5+ A*-C GCSE including En/Ma' exceeding 35% (from 23% in 2008)
- Eliminate unsatisfactory teaching from November 08
- Increase the proportion of good or better teaching to 60%, starting with Y11 by December 08, and leading on to all teaching in the department over the year.

What information or data did you use to measure progress towards your success criteria?

- Learning walks / study visits
- Observation outcomes
- Periodic teacher assessment
- Pupil consultation data
- Pupils' work
- Test results

Describe the CPD approaches you used

Two consultants were involved for much of the year, with a total input of about 25 days, a significant part of this being in planning and preparing resources for non-specialists. The department, from October, included 2 full time but not maths-trained staff, one long term supply with some maths background, and up to 15 non-specialists from other departments. These were joined later in the year by one subject specialist. Many of the teachers had

had some experience of teaching maths in the past, though generally only odd classes at KS3.

A key feature of the CPD was modelling of good practice through the lead lessons, schemes of work and resources. The non-specialists were all strong teachers and so they only needed to know how their experience could be applied to maths. Though they feared not being able to answer pupil questions, this was not an issue - even in the top set - mainly because of their professionalism in reading ahead. Classes had been allocated to staff carefully, and the top set went to an MFL teacher who had an A-level in maths. The consultants were available on e-mail to answer the few queries that were raised.

The new subject leader used systems that had worked in P.E. for tracking and monitoring and collaborated with the consultant to apply these to maths. There was a coaching role for the consultant here, that later widened to the new subject specialist as he took on a development role in the department, and was supported to re-organise the Schemes of Work in other years to reflect the Y11 model. Time was also spent on work scrutiny with the subject leader - largely to pinpoint issues that had been raised, and to monitor consistency across the department.

A few specific training sessions were run for non-specialists, on such topics as the use of calculators and formative marking in maths. The staff continued to follow the school CPD programme with input on general topics such as AfL.

What CPD materials, research or expertise have you drawn on?

CPD was tailored to the school, and the particular teachers. However, the resources developed for the schemes of work were based very much on the approaches seen in the Standards Unit Box 'Improving Teaching and Learning in Mathematics'.

The LA consultants each contributed a day a fortnight from October to March. After Easter one of the consultants continued with a similar level of support for the remainder the year. In addition, some of the National Challenge funding was used to buy-in further specialist help to run intervention sessions.

Who provided you with support?

- Local authority staff
- Middle leader
- Senior management
- Subject leader

How were you supported?

Teachers had support from:

- Lead lessons to model good practice
- Specialist planning of the lessons
- Regular meetings with subject leader.
- Discrete inputs for non-specialists

Subject leader (and wider subject leadership) had support from:

- Senior management through membership of the SLT
- Senior management through high-profile re-launch of the department
- Senior management through the delegation of resources.
- LA Consultant support in unit planning
- LA Consultant support through subject expertise in adapting generic systems and policies to a maths

setting.

Impact

What has been the overall impact on pupil learning?

Pupils are better able to assess their own progress and now know the curricular targets that will help them meet their grades. They are given opportunities both in and out of lessons to work on these targets, and take more responsibility themselves for reaching them.

The wide range of open tasks encountered has led to a much greater willingness to think about, and discuss mathematical problems. Pupils enjoy their maths lessons and recognise the progress that they make.

Thoughts you think are relevant to overall impact on learning

The focus on sharing objectives, assessing progress against these and then intervening promptly when gaps are identified, has empowered pupils to make progress. Pupils now believe that they can achieve their targets in maths if they work hard, and that the maths lessons will support them in this.

It is important to note that though the school allocated some of their best teachers to work in maths, the improvement in the proportion of good or better teaching went well beyond the effect of just these teachers. The fact that with these experienced teachers, discipline was not an issue allowed all the teachers of maths to concentrate on their teaching and learning, rather than chasing behaviour issues, thereby raising the standard all round.

Quotes you think are relevant to overall impact on learning

HMI Monitoring Inspection visit 8/7/09 - 'Students feel more confident about their learning in mathematics'

Y11 Intervention Evaluation Survey May '09 - 'Best maths lessons since I was at this school'

Increased enjoyment of lessons has resulted in positive attitudes to learning, especially in mathematics. (Ofsted report October 2009)

Results have improved, particularly in English and mathematics. (Ofsted report October 2009)

Quantitative evidence of impact on pupil learning

- CVA data
- Data comparison of cohorts
- Periodic teacher assessment
- Test results

Qualitative evidence of impact on pupil learning

- Learning walks / study visits
- Observation outcomes
- Pupil consultation data
- Pupils' work

Describe the evidence of impact on pupil learning

Pupil attitude surveys carried out internally during the school year showed a dramatic change in attitudes to maths as early as December. This was backed up by pupil interviews carried out by an external advisor in February, and termly monitoring visits by HMI. In a survey of Y11 students (example attached), carried out by the

LA consultant to evaluate the various interventions in maths, pupils were unanimously positive about the provision that had been made and the impact that it had had on their progress. Pupil tracking prior to the changes held nothing comparable to the regular unit grades, but once in place, these showed pupils gaining confidence as they regularly met their targets. Excellent attendance at additional intervention sessions, both after school and in the holidays, showed an increased desire to succeed and an understanding of the curricular targets to be met.

GCSE grades. The final evidence came at GCSE results time when 46% of pupils achieved C+ in maths, and the 5+ A*-C including En/Ma figure came in at 42% exceeding the school target of 35% by a considerable margin.

What has been the impact on teaching?

Unsatisfactory teaching has been eliminated, and the proportion of teaching that is good or better has steadily increased. Lessons are now more purposeful, and behaviour has improved considerably. Teachers were willing to admit it when they did not know something –and the pupils respected this, and quickly took on a much more collaborative role in the classroom.

Quotes you think are relevant to the impact on teaching

Y11 Intervention Evaluation Survey May '09

Q: What has helped you most this year?

A: 'Teacher who is honest when she doesn't know, and then finds out'

Increased enjoyment of lessons has resulted in positive attitudes to learning, especially in mathematics. Ofsted report October 2009 The rate of students' progress in Years 7 to 11 since the last inspection has been good, though better in English and mathematics than in science. Ofsted report October 2009.

Evidence of impact on teaching

- Evidence from observation and monitoring
- Evidence from planning
- Improvements in curriculum documentation
- Teacher perceptions

Describe the evidence of impact on teaching

Up to half of KS4 maths lessons were judged internally to be unsatisfactory immediately prior to the changes. The replacement of supply staff with strong non-specialists immediately reduced this to about 10% in KS4, and this continued to reduce to zero as the year progressed according to in-school monitoring (later confirmed as robust during HMI visit). At KS3, where a similar, though less intense, re-organisation was underway the figures followed a similar trajectory even with teachers who were judged barely satisfactory at the start. Over 60% of lessons were classed as good or better across all year groups by the end of the year.

The HMI Monitoring Inspection visit report 8/7/09 agreed, stating 'there is more good teaching and no inadequate lessons'.

What has been the impact on school organisation and leadership?

A strong effect of this initiative has been a growth of confidence in the school leadership, as the most intractable of their problems has been turned around using strengths available already within the school, or at their disposal through the LA.

Evidence of impact on school organisation and leadership

The school has been able to recruit more effectively due to the up-turn in Maths and has secured Key Stage Managers as well as main scale teachers. Despite this recruitment of specialist teachers the school has made the decision to keep the non-specialists teaching Maths throughout Key Stage 3 and 4. The varying styles of teaching and learning that have been developed have been seen as a real positive and has been maintained in order to continue the upward trend the department is on.

SLT decided to maintain the leadership structure of not having a Head of Dept and continued with the model of an Assistant Headteacher overseeing the subject with two key stage co-ordinators providing the Maths expertise. As a result of the student tracking developed in Maths by non specialist staff a group has been established to monitor students across every subject and thus providing greater monitoring of students towards whole school targets. This is jointly led between Maths and English.

Summary

What is the crucial thing that made the difference?

The SLT decision to deploy its strongest staff to address its biggest problem area, and the buy-in to this idea from these staff.

What key resources would people who want to learn from your experience need access to?

- Good teachers and good leaders, whether or not they are specialists, who are willing to invest in the success of maths.
- External subject expertise, willing and able to support this model.

What CPD session and resources were particularly useful?

CPD was largely achieved through the consultants modelling good maths teaching approaches in the lead lessons, and suggesting rich teaching resources through the planning materials. The number of subject specific CPD sessions organised by the consultants was small.

If another individual or school was attempting to replicate this work, where would they start and what would the essential elements be?

- A school attempting to replicate this work would need to start by evaluating their own capacity to dedicate strong leaders and teachers to maths. If so, then achieving buy-in from these staff is an essential step.
- A good working relationship with specialist support eg consultant or AST, who can offer the time required, whilst ensuring that the management and drive for the initiative always come from within the school.
- Some visible changes at the start of the project to show that maths really is changing.

What further developments are you planning to do (or would you like to see others do)?

The next targets for the maths department at The Radcliffe School are to continue to improve attainment (with a maths target of 55% C+ for 2010) and to build internal capacity so that intensive external support can be phased out by the end of the year. The links with non-specialists are being maintained, though less extensively as specialist recruitment has taken place.

Supplementary Materials

This report is accompanied in the library by the following supplementary material:

- Pupil evaluation of interventions survey (blank)

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About 'What Works Well'

This case study was originally published as part of the 'What Works Well' section of the National Strategies for Education in England. The National Strategies were professional programmes aiming for improvements in the quality of learning and teaching in schools in England. 'What Works Well' involved teaching practitioners from all phases and areas of education sharing accounts of real developments which had improved learning and teaching, and made a difference to pupil progress. 'What Works Well' case studies were designed to support practice transfer and include sufficient detail and resources to enable others to implement the effective practice described. They were reviewed by experts prior to publication as 'User Generated Content' (UGC) under a licence which encouraged reuse and derivative works, but which precluded commercial use.

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