



CASE STUDY REPORT

Creative maths to engage pupils and raise standards

Ashley Brett

This study was originally published in 2009 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 National Curriculum test results in mathematics by engaging pupils in practical activities and providing structured support from the Local Authority.

Aims: The main aim was to improve National Curriculum test results in maths by engaging pupils in practical activities and providing structured support to teachers.

Methods: The participants included the head of school improvement, headteacher, middle leader, National Strategies consultant, senior leadership team, SIP, subject leader, teacher, Local Authority Curriculum Adviser, AST, Primary Strategy Manager, and consultant. Methods used included structured PDMs, INSET training days, modelling teaching, use of working walls, cross-curricular activities, parent workshops, and data-based progression grids.

Findings: The main findings are that engaging pupils in practical maths activities and providing structured CPD support has resulted in improved NC results, raised self-esteem and confidence, improved behaviour, and improved social skills.

Implications: The findings suggest that engaging pupils in practical maths activities and providing structured CPD support can lead to improved NC results, increased self-esteem and confidence, improved behaviour, and higher expectations of teaching and learning.

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

Keywords: Primary education; Creativity; Leadership; Self evaluation and review; Mathematics

Introduction

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

National Curriculum test results historically low in maths (e.g. 2004/2005)

Progression from 2004 to date =

- 2004 (11% L4);
- 2005 (47% L4);
- 2006 (81% L4; 7% L5);
- 2007 (93% L4; 14% L5).

Pupils underachieving and not making expected rates of progress.

High mobility in Years 4, 5 and 6.

Offered structured support by Local Authority in September 2005 - (planned in liaison with needs of the children).

Gap analysis highlighted poor Using and Applying (Ma1) skills actively and systematically used by pupils.

Who might find this case study useful?

- Head of school improvement
- Headteacher
- Middle leader
- National Strategies consultant
- Senior leadership team (SLT)
- SIP (School Improvement Partner)
- Subject leader
- Teacher

Description

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

- Creativity
- Leadership
- Self evaluation and review
- Mathematics

How did you intend to impact on pupil learning?

By engaging pupils in practical maths in order for them to secure skills to transfer to other areas of learning.

What were your success criteria?

- Improvement in NC results
- Pupil tracking grids show that pupils make 2 levels progress per key stage
- 80%+ pupils are working at age-related expectations
- Underachievers (including SEN) moving towards age-related expectations
- Improvements in data reflected in Raise-online

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

- CVA data
- Data comparison of cohorts
- Learning walks / study visits
- Observation outcomes
- Periodic teacher assessment
- Pupils' work
- Test results

Describe the CPD approaches you used

As part of a structured support package implemented in liaison between the school and the Local Authority, a range of cross-curricular activities were delivered via structured PDMs which facilitated gap tasks for teachers to carry out and evaluate.

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

- Support from Local Authority Curriculum Adviser- Mathematics, Consultant, AST, Primary Strategy Manager
- Essex-based CPD
- Materials from National Strategies

e.g.

Who provided you with support?

- External agency

How were you supported?

Curriculum Adviser for Mathematics supported termly action plans involving target setting and target getting in Using and Applying in maths, with a focus on implementation of practical activities within a classroom context, including use of language, ICT and interactive displays.

There was also dedicated INSET training days on problem solving activities and how to use success criteria.

AST supported with modelling teaching and securing subject knowledge and help with planning.

Advisory Head was actively involved in supporting the school in planning for differentiation, marking to show next steps targets and how pupils could be involved with this process.

Consultant support included:

- delivery of PDMs on questioning and use of language skills
- the use of working walls to facilitate games and activities
- cross curricular links between P.E. and maths (including the use of problem solving skills)
- higher-order thinking skills to promote progression of Ma1 skills
- activities in mental and oral starters related to Ma1

Consultant also supported teachers in class and helped to identify relevant next steps to support teaching and learning. Consultant worked with individual staff as a follow-up to school-initiated audits of strengths and areas for development. This focused on problem solving and ideas for activities, calculator skills and practical investigations.

Primary Strategy Manager led workshops on Gifted and Talented (as part of a local delivery group input) and ideas on mental maths and roleplay in acting out problems. Parent workshop was held, which included use of Ma1 and suggested practical ideas to support pupils at home.

Please refer to the summary page (related information) for some key resources.

Impact

What has been the overall impact on pupil learning?

NC results dramatically improved.

Change in pupil attitude towards learning with an 'I can'/'have a go' ethos, which has raised self-esteem and confidence within maths. This has been evidenced from lesson observations and children's engagement. There has also been improved behaviour, improved social skills, which was corroborated by Ofsted December 2006 which awarded the school an overall grade of a strong 2.

Children are more able to work independently and to access support strategies suggested within class environment e.g. Thinking Actively in a Social Context (TASC wheel, as conceived by Belle Wallace). There is an expectation for this trend to be sustained over time.

Thoughts you think are relevant to overall impact on learning

There has been a steep learning curve within the school from underachievement in September 2005 to having a good Ofsted in December 2006 and having above average SATs results in July 2007. The school was recognised as the 4th most improved school in England 2006-2007.

Quotes you think are relevant to overall impact on learning

A success culture is fully embedded within the school's pedagogy. (Headteacher)

The school provides pupils with a stimulating, exciting and relevant curriculum. (Consultant)

There is a buzz here when we do maths - we know why we are learning because our teacher makes links to the real world. (Pupil Year 6)

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

NC results improvement - 2004 (11% L4); 2005 (47% L4); 2006 (81% L4; 7% L5); 2007 (93% L4; 14% L5).

What has been the impact on teaching?

Knowledge, understanding and confidence has improved in the delivery of lessons - evidenced by Ofsted, lesson observations, National Curriculum results and comparative data. There have been raised expectations of teaching and learning. Monitoring information shows children are receiving regular feedback on the progress they are making in achieving their next steps in learning.

All classroom environments, including resources, effectively support teaching and learning.

Quotes you think are relevant to the impact on teaching

The quality of teaching and learning is good overall and as a result boys and girls of all abilities achieve well. Teachers plan lessons well, taking good account of what pupils already know and can do. Pupils find lessons enjoyable because teachers make good use of interesting methods, such as pupils interviewing each other... Pupils know what the learning targets are for lessons and also what skills each one of them needs to practise next to improve further.

Assessment is good and the school has effective systems to monitor pupils' progress.

Marking is regular and accurate and provides next steps. (Ofsted 2006)

Evidence of impact on teaching

- Evidence from observation and monitoring

Describe the evidence of impact on teaching

Lesson observations indicate that children are keen to participate in their learning and that there is good behaviour and clear expectations. Learning intentions and success criteria are shared with pupils which helps them to know how to improve. There is a clear focus on personalised learning. Open and closed questions are differentiated to pupils' abilities, enabling all children to contribute; this includes the use of children's questions as part of the learning.

What has been the impact on school organisation and leadership?

Maths subject leader has been enabled to support staff with the delivery of the National Curriculum in a creative and active way to engage children and move them forward in their learning.

Evidence of impact on school organisation and leadership

Pupil progress is monitored termly by the senior leadership team, the maths subject leader and staff to track pupils and identify when early intervention is required. Additionally, barriers to progress may be discussed by the senior leadership team and maths subject leader with teachers, and facilitate next steps actions e.g. creativity and cross-curricular links.

Summary

What is the crucial thing that made the difference?

Engagement and openness of staff who have high expectations of pupils and a strong will to improve their own teaching; the positive relationship with the Local Authority has facilitated this.

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

Local Authority support

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

- School audit of strengths and areas for development.
- Raising Attainment Plan to identify focused areas for development with time constraints, which is assessed and evaluated half-termly.
- Data-based progression grids in order to pick up underachievers.
- Focused PDMs with key expected outcomes and next steps which are identified, monitored and reviewed.

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

Continued engagement with creativity and maths e.g. maths and the movies.

Supplementary Materials

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

- Elements of planning - cross curricular themes implicit
- Example of layered targets
- Alternative questions
- Blooms taxonomy and maths
- G and T elements for planning broader deeper faster independent reflection
- Questioning - Elm Hall
- Dialogue ppt
- Maths and PE
- Gifted and Talented activities
- Incorporating maths into PE
- KS1 G and T
- KS2 G and T
- G and T input
- Broader deeper faster etc examples
- Planning examples of broader deeper faster etc
- Probing questions Reception
- Probing questions Year 1
- Probing questions Year 2
- Probing questions Year 3
- Probing questions Year 4
- Probing questions Year 5
- Probing questions Year 6

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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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