

Primary Mathematics Wave 3 Intervention Training (Fully Funded)

Targeting support: implementing interventions for children with significant difficulties in mathematics.

This training will provide an opportunity for schools to explore the new Primary National Strategy pack for Wave 3 with members of the Norfolk maths team and teachers who have been piloting these materials in schools. Schools attending will be given relevant training materials on the day.

This half-day conference is fully funded for one person from each primary phase school. Teaching assistants are welcome to attend with the teacher.

List of Training Dates and Venues:

4MN084 - 09/6/2005 - 9.15-11.45 WNPDC
 4MN085 - 09/6/2005 - 1.15-4.00 WNPDC
 4MN086 - 10/6/2005 - 9.15-11.45 Aylsham Lodge Hotel
 4MN087 - 15/6/2005 - 9.15-11.45 NPDC
 4MN088 - 15/6/2005 - 1.15-4.00 NPDC
 4MN089 - 20/6/2005 - 9.15-11.45 Norfolk Golf Country Club
 4MN090 - 20/6/2005 - 1.15-4.00 Norfolk Golf Country Club
 4MN091 - 22/6/2005 - 9.15-11.45 Regency Dolphin Hotel
 4MN092 - 22/6/2005 - 1.15-4.00 Regency Dolphin Hotel
 4MN093 - 28/6/2005 - 9.15-11.45 NPDC
 4MN094 - 28/6/2005 - 1.15-4.00 NPDC

Course Leader (s) : Jean Johnson, Kevin Blogg & Sue Robinson

Who should attend

Headteacher	<input checked="" type="radio"/>	Head of Dept.	<input type="radio"/>
Deputy Head	<input checked="" type="radio"/>	Classroom teacher	<input type="radio"/>
SENCO	<input checked="" type="radio"/>	Returner	<input type="radio"/>
Subject Leader	<input checked="" type="radio"/>	NQT	<input type="radio"/>
Classroom Assistant	<input checked="" type="radio"/>	Nursery Nurse	<input type="radio"/>
Supply Teacher	<input type="radio"/>	Pre-school Practitioner	<input type="radio"/>
Governors	<input type="radio"/>		

Other: Inclusion Co-ordinator

Phase

First
 Infant Junior
 Primary
 Middle
 Special

Cost:

£0.00

How to book

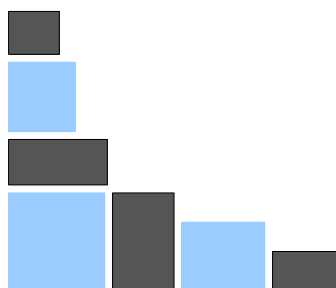
To apply for a place at this activity please visit our INSET Opportunities website at <http://advisoryservice.norfolk.gov.uk/inset> or complete a booking form and return it to:

Michelle Smith
 Norwich Professional Development Centre
 Woodside Road
 Norwich
 NR7 9QL

Telephone: 01603 433276 **Fax:** 01603 700236

E-mail: michelle.smith@norfolk.gov.uk

Date	Time	Venue	Reference
20/6/2005	1.15-4.00	Norfolk Golf Country Club	4MN090





Targeting support: implementing interventions for children with significant difficulties in mathematics

This guidance aims to help you review and plan the provision you make for children who experience difficulties in mathematics.

Three 'waves'

Provision for effective mathematics learning and teaching can be described in terms of three 'waves' of intervention.



Wave 1 The effective inclusion of all children in high-quality learning and teaching of mathematics in the daily mathematics lesson.



Wave 2 Additional time-limited provision in the form of small-group intervention to accelerate progress and enable children to work at age-related expectations.



Wave 3 Additional time-limited provision to enhance the progress of identified children where Waves 1 and 2 are not, on their own, having the desired effect. This will involve focused teaching activities which tackle fundamental errors and misconceptions that are preventing progress.

The significance of effective Wave 3 provision for children with mathematical difficulties

Although in 2004 there was some improvement in the proportion of children achieving below level 3 in mathematics by the end of Key Stage 2, this proportion has not changed significantly over the last four years. Research shows that targeted interventions in mathematics can have a significant impact on children's performance and self-confidence.

**Headteachers,
SENCOs/inclusion
coordinators,
mathematics
coordinators and
teachers, Primary
Strategy Managers,
LEA advisers/
inspectors and
consultants**

Status: Recommended

Date of issue: 01-2005

Ref: DfES 1083-2005

The Primary National Strategy's Wave 3 materials

Supporting children with gaps in their mathematical understanding

New mathematics materials from the Primary National Strategy were piloted in 2003–04 and will be available to all schools in spring 2005. The materials are aimed at children in Key Stage 2 and follow the principles for successful intervention identified by research described later in this guidance.

A focus on the most commonly occurring types of mathematical difficulties

The materials focus on number and calculation, tackling areas such as understanding the structure of number and operations between numbers. Problem-solving is integrated and exemplified in the materials, and opportunities are provided for children to develop mathematical vocabulary.

An individualised approach based on the particular areas the child finds difficult

The materials reflect best practice in assessment for learning and include tracking children's learning charts that support the identification of the particular knowledge, skills and understanding with which the child needs help.

Relatively small amounts of individualised intervention

The teaching activities provide brief, focused teaching sessions, which make it possible for the child to benefit more fully from whole-class teaching. Where appropriate, the activities finish with related activities for whole-class use in order to reinforce individual learning and promote inclusive practice.



The Primary National Strategy Wave 3 mathematics materials evolved as feedback was provided through pilot LEAs and in response to relevant research. The guiding principles informing the design are:

- flexibility so that teachers can adapt them;
- sharing the purpose of each activity with the child to encourage reflection on, and ownership of, learning;
- highlighting and modelling key vocabulary throughout;
- teaching activities finishing with related activities for the whole class, where appropriate;

- use of a variety of images and models, aiming to include some the child may not have met before;
- linking mathematics to familiar and relevant contexts;
- integrating and exemplifying mathematical problem-solving;
- inclusion of games among teaching activities, possibly for sharing with parents and carers.

The materials reflect best practice in assessment for learning as a key tool for raising achievement, through:

- the use of questions to elicit information about children's understanding;
- sharing the purpose of the activity with the learners;
- encouraging children's reflection on their learning and identification for themselves of possible next steps.

The following mathematical themes are fundamental to the approach.

- Using and applying mathematics has been integrated. Often there are several opportunities for problem-solving within one activity, but in each, one particular opportunity has been highlighted. Aspects such as the following are incorporated.
 - Encouraging children to discuss and explain in order to support development of their mathematical reasoning.
 - Opportunities for children to make choices woven into the activities, for example, selecting numbers, devising calculations.
 - Encouraging children's own recording to communicate mathematical thinking, focusing on efficiency.
 - Opportunities for evaluating the efficiency of methods of calculation.
- Language development is emphasised and key vocabulary is listed in each activity. It is important for adults to use correct mathematical language and, to facilitate this, examples are given in words, for example, 725×3 is accompanied by what the adult could say to the child: 'Seven hundred and twenty-five multiplied by three.'
- There is a focus on progression in counting from the earliest stages through to Year 6 to support the development of secure counting skills.
- Throughout the materials there is emphasis on the process of estimating first, then calculating and then checking.
- Decimals are addressed within meaningful contexts, for example, via displays on a calculator and as a part of measure.

- Structured equipment and everyday materials are used to model mathematical concepts, supporting children's mathematical thinking and development of mental imagery. Some links to ICT resources such as the Primary National Strategy Interactive Teaching Programs (ITPs) are included.
- A wide range of resources is used in the teaching sessions. Teachers' selection of these to suit the needs of their children is an important part of adapting the materials.

The pack contains:

- two sets of A4 booklets, one focusing on common errors/misconceptions in addition and subtraction, and the second on common errors/misconceptions in multiplication and division. The booklets contain teaching materials, referenced by year group to the key objectives in the National Numeracy Strategy *Framework for teaching mathematics*;
- an A4 booklet, *Resources and index of games*. This booklet contains lists of mathematics equipment and everyday materials referenced in the teaching materials, photocopyable resource sheets, and an index of games contained in the teaching materials;
- an A4 booklet, *Using the pack*. Within this are:
 - management guidance (whole-school and classroom);
 - tracking children's learning charts for addition and subtraction, and multiplication and division;
 - a professional development session to introduce Wave 3 mathematics support with particular reference to the use of the Primary National Strategy Wave 3 mathematics pack;
- an interactive CD-ROM providing direct access from electronic versions of the tracking charts to the teaching materials in pdf and Word document formats. This enables the teaching materials to be easily adapted.

Review of research* into what works for children with mathematical difficulties

**What works for children with mathematical difficulties?* (DfES research report 554), available from DfES Publications (tel: 0845 60 222 60) or downloadable from the website at www.dfes.gov.uk/research

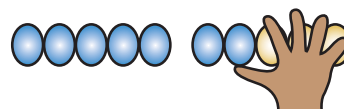
The DfES recently commissioned a research review to identify what works for children with mathematical difficulties. This review covers:

- findings about the incidence of mathematical difficulties and their common characteristics;
- the important fact that arithmetical ability is not a single entity, but is made up of many components, with the effect that arithmetical difficulties are varied and heterogeneous;

- implications for intervention;
- recommendations for further educational research and for practice in schools.

Children's mathematical difficulties and their common characteristics

The review suggests that mathematical difficulties are common and often quite specific. They are equally common in boys and girls, in contrast to language and literacy difficulties, which are more common in boys. Children's mathematical difficulties can take several forms. The causes for such difficulties are varied and include, for example, individual characteristics, inadequate or inappropriate teaching, absence from school resulting in gaps in mathematics learning, and lack of pre-school home experience with mathematical activities and language.



The ability to calculate is made up of many components

Although mathematics includes much more than arithmetic (for example, geometry, measurement, algebra), most studies of mathematical disabilities and difficulties have focused on problems with number and arithmetic.

Research has shown that children with mathematical difficulties typically combine significant strengths with specific weaknesses. Most commonly, they have a good informal understanding of number concepts, but have trouble in using written symbolism and standard school methods. Some have particular difficulties with the language of mathematics. Some children appear to have very limited number understanding at first sight, but still have a good understanding of counting techniques and principles.

Difficulty in remembering number facts is a very common component of arithmetical difficulties, often associated with dyslexia. Not all children with arithmetical difficulties have this problem, however. Some children, for example, can remember many number facts, but seem to lack strategies (including suitable counting strategies) for working out calculations when they do not know the

answer. Some children can deal with single-digit arithmetic but have serious difficulty in achieving even a limited understanding of tens, units and place value.

Other common areas of difficulty identified in the report include word problem-solving, representation of place value and the ability to solve multi-step arithmetical problems.

Implications for intervention

The review endorses that children's difficulties with calculation are highly susceptible to intervention. These interventions can take place successfully at any time and can make an impact. It is not the case that a large number of children are simply 'bad at maths' and that nothing can be done about it.

Moreover, individualised work with children who are falling behind in number and calculation has a significant impact on their performance. The amount of time given to such individualised work does not, in many cases, need to be very large to be effective. Short but regular interventions of individualised work may bring a child to the point where they can profit much better from the whole-class teaching that they receive.

The profiles of children's difficulties with calculations vary but there are commonly occurring errors and misconceptions. Mathematics assessment is used well when it enables teachers to identify the specific problems that children are experiencing, and to profile both strengths and weaknesses. It is important to find out what specific strengths and weaknesses an individual child has and to investigate particular misconceptions and incorrect strategies that they may have. Interventions should ideally be targeted towards an individual child's particular difficulties. If they are targeted, then most children may not need very intensive interventions.

Children may require different degrees and types of intervention at various stages of their mathematical development. A set 'programme' is less likely to be successful. This is because the ability to calculate is not unitary: it is made up of many components, ranging from knowledge of the counting sequence, to estimation, to solving word problems. Moreover, though the different components often correlate with one another, weaknesses in any one of them can occur relatively independently of weaknesses in the others. Several studies have suggested that it is not possible to establish a strict hierarchy whereby any one component invariably precedes another component.

Interventions that focus on the particular components that an individual child has difficulty with are likely to be more effective than those that assume all children's number and calculation difficulties are similar.

Examples of successful interventions that are individualised and componential include:

- *Mathematics recovery*, an intervention for low-attaining 6- and 7-year-olds involving 30 minutes a day of individual teaching over a period of 12–14 weeks;
- *Numeracy recovery*, a similar but less intensive intervention taking place weekly over a period of about 30 weeks.

More information about these interventions can be found in the research review.

The review also examines the use of computer programs for individual instruction, the use of setting and the role of teaching assistants. It concludes that:

- computer-based interventions can be effective but tend to result in less progress than intervention carried out by teachers;
- streaming and setting, as commonly used, may have deleterious effects on low achievers' performance, not because they take too much account of individual differences, but because they lead to taking too little account of individual differences;
- the use of teaching assistants to support children with numeracy difficulties is not a panacea in itself, but may have beneficial effects if assistants are suitably trained and effectively deployed.

School self-evaluation and management of Wave 3 mathematics provision

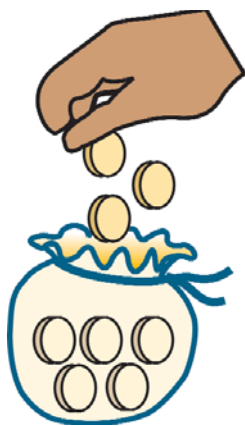
Schools may find the following helpful in considering the effectiveness of their practice for low-attaining children.

Quantitative self-evaluation

- How does the percentage of our children who achieve below level 3 in mathematics at the end of Key Stage 2 or below level 2 at the end of Key Stage 1 compare with the national averages and the averages for similar schools (FSM and prior attainment)?
- How do we evaluate our children's progress from the beginning to the end of a period of Wave 3 intervention?
- How do we use data to identify those children who could benefit from Wave 3 intervention?
- How does the progress we achieve for children with low prior attainment compare with that achieved nationally or locally?

Qualitative self-evaluation

Schools can compare their own Wave 3 provision with a set of quality guidelines derived from research and best practice (see next page).



Key activities	Our Wave 3 provision in mathematics	Comments/actions
Establishing priorities, analysing results and reviewing progress	<ul style="list-style-type: none"> Is informed by clear expectations, and the tracking of individual children's progress Involves the diagnostic assessment of children's strengths and weaknesses Incorporates regular review and assessment of progress as an intrinsic part of the provision 	
Continuing to improve the quality of learning and teaching	<ul style="list-style-type: none"> Is taught and overseen by personnel with appropriate skills and expertise to adapt and tailor teaching to the child's identified needs Builds in assessment for learning as a fundamental part of the activity Ensures close connections between the intervention and the teaching of the whole class 	
Leading intervention and managing and deploying resources to meet the needs of all children	<ul style="list-style-type: none"> Is led by members of the school's leadership team who are responsible for strategic planning Is managed by an identified member of staff who oversees the intervention on a day-to-day basis Is part of a coherent whole-school approach to the three waves of intervention Is based on as early an intervention as possible Ensures that a range of age-appropriate interventions are available Ensures that over time the entitlement of all children to a broad and balanced curriculum will be maintained Establishes regular monitoring and evaluation of the impact of Wave 3 mathematics provision 	

Key activities	Our Wave 3 provision in mathematics	Comments/actions
Engaging and communicating with children and others	<ul style="list-style-type: none"> • Ensures that children are involved in the assessment of their own learning and progress • Develops children's capacity to be independent learners • Develops children's self-confidence and image of themselves as successful learners of mathematics • Ensures good communication and effective partnerships between all involved in children's learning, especially parents and carers 	
Identifying continuing professional development needs	<ul style="list-style-type: none"> • Uses an approach for which there is an infrastructure of support for both teachers and teaching assistants who are involved • Ensures that all staff understand the whole-school approach to Wave 3 mathematics provision and their role within it 	

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