

The National Strategies' Programmes of Support for the National Challenge

National Challenge Core Plus mathematics programme

Element 6: Securing consistent pupil performance across core subjects (addressing factors influencing in-school variation)

National Challenge Core Plus mathematics programme

Developing Personal Learning and Thinking Skills (PLTS) in mathematics

Rationale

In some schools there is a significant group of pupils who under-perform in mathematics although they are on track to success in a number of other subjects. For example, these pupils may be on track for more than 5 A* to C GCSE and in line for a good grade in English. It would not be unusual for this cohort to include a disproportionate number of girls. (Use the Venn analysis tool to explore this aspect – see RAP management guide and Element 6 of Stronger Management Systems.)

It is important for such pupils to transfer their success from one curricular area into another. Developing thinking skills that use strategies common to the pupils' 'stronger' and 'weaker' subjects can help to do this. The strategies can also add to a repertoire of active revision; for example, reading images, collective memory, concept mapping and advance organisers. Such strategies for teaching thinking skills are described for a range of subjects in the *Leading in Learning* (LiL) materials. There is evidence that when teachers jointly plan and deliver lessons using specific and explicit links between teaching strategies and thinking skills across two or more subjects, pupils are motivated to succeed. Teaching assistants working in both subjects can help to reinforce this transfer.

During the early stages of developing thinking skills, it is not unusual for teachers to recognise that pupils are also improving the social and emotional aspects of learning (SEAL). The improvement is likely to be greater if this aspect of PLTS is also being supported through a whole-school approach to develop direct and focused approaches that support pupils to learn and consolidate social and emotional skills (see Help sheet: *HS5 SEAL summary*).

Using such an approach will:

- accelerate the progress of these pupils in mathematics so that they have a better chance of achieving a grade C
- strengthen key areas of weakness in PLTS and mathematics
- support pupils' learning and motivation in relation to mathematics by linking mathematics to other subjects
- increase teachers' repertoire of teaching strategies
- create stronger links between the planning and teaching in two or more departments
- encourage safe learning environments where pupils recognise that errors and mistakes are an essential part of effective learning.

As significant external examinations approach, much of the teaching is focused on revision and the choice of teaching strategies is even more important. By definition, these sessions include areas which have been 'covered' many times before and many pupils struggle to engage with revision in ways which make them think and help them to remember. Choosing strategies from the Leading in learning handbook and developing these as revision tools across more than one subject can provide the pupil with a repertoire for more active and effective revision.

(See Element 1b.)

Quality standards

The approach is flexible so that provision can be designed by teachers to meet the needs of particular groups of pupils in their own school context. In the best cases this will include:

- joint planning across subjects, using cycles of lessons in mathematics and at least one other subject. For the occasional lesson, teachers are invited, not to abandon their subject, but to set subject content in a context where the objective is to develop a selected thinking skill and how it might be used in other subjects or in real life
- making connections in each of the lessons, by focusing on a particular thinking skill through the use of a common teaching strategy (ten are described and exemplified in a range of subjects)
- choosing the common strategy so that it is effective in developing the selected thinking skill and provides a suitable context for each lesson
- identifying of the social and emotional skills best suited to jointly cover the agreed subject areas.

Exemplification

Some teachers in the mathematics department will plan in partnership with another subject. The pupils will become aware that they are more successful in other subjects compared to mathematics and this will help them to see what aspects of thinking the approach is aiming to improve. Decisions about what combination of subjects to use would be decided by:

- the needs of the pupil group
- the relative expertise of the staff in the different subject areas and the potential partnerships to share and develop improved practice.

<p>Actions for the mathematics department</p> <p>Weeks 1 and 2: plan</p> <p>Teachers and teaching assistants in mathematics and other subject(s) plan lessons using common strategies and developing the same thinking skill. Guidance on planning, teaching, observation and review are available in the <i>Leading in Learning Key Stage 4 Handbook for teachers handbook</i>:</p> <ul style="list-style-type: none"> – guidance on planning, pp. 21–4 – collaborative planning sheet, p. 112 – guidance on the teaching, pp. 25–31 – lesson observation schedule, p. 113 – collaborative review, p. 114. <p>Identify lesson sequencing so that, although set in a different subject context, one LiL lesson explicitly builds on and develops the thinking from the previous LiL lesson.</p> <p>Identify those social and emotional learning outcomes which could also be developed through this approach, for example ‘work cooperatively’.</p> <p>Plan for the delivery including: timetable requirements, peer working, evidence gathering, review time between the sequence of lessons.</p>	<p>Related leadership and support, senior leadership team (SLT), subject leader (SL), key teacher, advanced skills teacher (AST), consultant</p> <p>Decide who is providing the strategic lead at each stage and for each activity.</p> <p>Identify the pupils and teachers. Maintain a strategic focus on target groups of pupils.</p> <p>Organise the joint planning and teaching, for teachers from the different departments, securing sufficient time for groups of teachers and teaching assistants (TAs) to meet and plan (part of a regular cycle).</p> <p>Meet with the teachers and agree the delivery requirements, expected outcomes and review date.</p> <p>Decide how whole-school behaviour for learning strategies can be developed within the teaching cycle.</p> <p>Lead the planning; ensure that templates are prepared so that observations and joint teaching provides evidence for the review.</p>
<p>Actions for the mathematics department</p> <p>Weeks 3 and 4: teach</p> <p>Teach the lessons, including some joint teaching or observations, to groups which include target pupils. Make explicit reference to the transfer of learning from one subject to the next.</p> <p>Use agreed lesson prompts.</p>	<p>Related leadership and support (SLT, SL, key teacher, AST, consultant)</p> <p>Organise in-class support, including support for behaviour for learning.</p> <p>Ensure that non-specialists feel supported. This should include provision of additional preparation time working on the mathematics of the task.</p> <p>Provide space for teachers to engage in a critical review of their own practice, using the support of colleagues in other subjects.</p>

		<p>Ensure that observations of pupil progress feed back and inform planning of the next lesson.</p> <p>Support and encourage teachers as they try new strategies, offering constructive practical solutions for improvement.</p> <p>Gather evidence of impact through observations. Include observation of pupil punctuality, attendance and improved social and emotional outcomes such as greater resilience. (See Help sheet, <i>HS5: SEAL summary</i>.)</p>
Actions for the mathematics department	Related leadership and support (SLT, SL, key teacher, AST, consultant)	
Weeks 5 and 6: review		
<p>Teachers use all available evidence to jointly review the lessons and the progress in thinking and to decide the next focus. This will be a new teaching strategy to either develop the same aspect of thinking or to develop a new aspect of thinking.</p>	<p>Organise and lead the review of impact using the evidence provided by teacher reviews, lesson observations schedule, pupils' outcomes and pupils' responses.</p> <p>Feed into the review meeting, evidence of impact on progress, engagement and perceptions.</p> <p>From the review, summarise the evidence of impact in terms of PLTS, pupil attitudes and engagement and mathematical understanding. Use summarised outcomes to inform the Raising Attainment Plan (RAP) evaluation.</p> <p>Ensure an appropriate focus is selected for the next cycle. Bear in mind that teachers and pupils may need a few cycles before they can confidently note that aspects of thinking have improved.</p>	

As a significant external examination approaches, there is no reason to suspend or abandon the cycle of teaching. Many LiL strategies prove to be useful tools across subjects for exam revision and preparation; for example, Reading Images, Collective Memory, Concept Mapping and Advance Organisers. Helping pupils to increase their repertoire of revision strategies in ways which transfer across subjects is enabling and motivating. (See Element 1b.)

Review

Review against Quality standards.

After six weeks of implementation, make a judgement about the extent to which:	Specify exactly who will make the judgement – choose from: SLT, SL, key teacher, AST, consultant	Specify how this will inform the RAP and next steps
Pupils actively engage in group work in a series of challenging problems or tasks.		
Pupils develop language to describe their thinking.		
Pupils recognise how their thinking transfers from one subject to another.		
Teachers give explicit emphasis to PLTS and transfer of learning across subjects.		
Teachers recognise the potential of the LiL strategies to enrich the scheme of work and to strengthen the departmental programme of revision and exam preparation.		

Case studies

Case study A: a local authority (LA) network, 'Raising attainment through thinking skills'

A group of teachers from five schools worked together on a project that aimed explicitly to 'close the gap' between English and mathematics attainment at GCSE. The project aimed to raise attainment for a group of Year 11 pupils whose tracking data indicated they were on the C/D borderline for mathematics and who were therefore likely to miss the chance of attaining five or more A* to C grades at GCSE, including English and mathematics.

The group used strategies and collaborative, cross-subject approaches drawn from the LiL materials with the aim of improving these pupils' thinking skills in mathematics. The targeted Year 11 pupils will sit their GCSEs in summer 2008 so, at the time of writing, GCSE results are yet to be confirmed. However, teachers noted an improvement in pupils' metacognitive responses through informal classroom assessment. The pupils were significantly better able to express their thinking with appropriate language and to bridge effectively across their learning. Teachers across the subjects involved in the schools observed improved skills in elements of information processing such as locating and collecting relevant information, sorting and classifying, sequencing, comparing and contrasting and analysing part/whole relationships.

The teachers felt that the experience has given them skills that will help them to plan effectively to develop pupils' functional skills in mathematics and to track progress in conjunction with colleagues in other departments. The perceived benefits to pupils'

learning have led to a greater willingness to engage in cross-curricular collaborative work.

Case study B: a shortage of specialist mathematics teachers

In this case the school has a shortage of specialist teachers of mathematics, greater capacity in the English team and a TA who already has some experience supporting PLTS in humanities with pupils in Key Stage 3. The school has also identified a group of pupils, predominantly girls, who are high performers in English and humanities but who are at risk of missing their grade C in mathematics. The senior leader overseeing mathematics decides to offer this approach by working with the mathematics SL to re-organise the underperforming pupils into a separate mathematics set. The English teacher and teaching assistant are allocated time to support the mathematics teacher in the planning and delivery of mathematics lessons using LiL strategies.

Case study C: science and mathematics teachers

In this case the school has an experienced teacher who is confident to teach both science and mathematics. Pupils from a target group are reorganised so that she teaches the LiL lessons to the same pupils for both science and mathematics with the same TA allocated to both groups. A developing mathematics teacher shares the teaching in the mathematics lessons and transfers the approach to his other mathematics teaching groups.

Resources

Secondary mathematics planning toolkit, 'Rich tasks' folder (DCSF ref: 00342-2008CDO-EN):

Leading in Learning: KS4 Handbook for teachers (DCSF ref: 2111-2006DWO-EN)

Leading in Learning: Exemplification in mathematics (DCSF ref: 0050/2005 WO)

A copy of this DVD can be obtained from the LA mathematics consultant or ordered from DCSF Publications T: 0845 60 222 60, email: dcsf@prolog.uk.com

Available on the National Strategies website: Social and Emotional Aspects of learning for Secondary schools: Guidance Booklet (DCSF ref: 00043-2007BKT-EN)
(<http://www.standards.dcsf.gov.uk/nationalstrategies/node/65860>)

The Venn analysis tool – see RAP management guide and Element 6 of Stronger Management Systems

Continuing Professional Development (CPD)

The full set of *Leading in Learning* (LiL) materials, including a guide for school leaders, training manual and subject exemplification for a range of other subjects, can be downloaded from:

www.standards.dcsf.gov.uk/nationalstrategies/secondary/keystage3/all/respub/ws_lil_t_s

The website to support social and emotional aspects of learning can be found at:
www.bandapilot.org.uk/