

Changes in the Framework for teaching mathematics - the ATM response

The framework for teaching mathematics is generally well structured and care must be taken not to lose the structure by 'tinkering' with various elements.

The Foundation Stage

Early Years' specialists, both practitioners and advisers, are clear that the inclusion of Reception objectives in the Framework - particularly that differ to those in the FS guidance - causes undue pressure and confusion for both FS child and practitioner. There finally needs to be proper recognition of what FS mathematics looks like in practice, which this has never been the case within the Numeracy Strategy. This is a major concern of all those who work with FS children, in schools and settings across the country. The FS is a distinct phase and must be recognised as such.

There should be clear links between the Foundation Stage guidance and the Primary Strategy. Year 1 teachers and above should be encouraged to build on both the work and approach of the foundation stage. This is easy to say but not nearly so easy to carry out. For example, the FS must be built on in the sense of flexibility of time - with time allowed for longer projects, as well as time being spent on child initiated as well as adult initiated work.

In particular, it is time for due recognition of the role that 'sustained shared thinking' between practitioner and learner plays in nurturing mathematical thinking (reference the EPPE research: 'Researching Effective Pedagogy in the Early Years: Research Report 356', Siraj-Blatchford, Sylva et al, DfES, 2002).

Whilst it might have once been considered useful for year 1 teachers to be able to see what has been covered in FS in one document, not only do the objectives differ to those in the FS guidance, but we must question how useful this has been in practice. The current inclusion has not led to an holistic learning experience for children, or continuity from R to year 1.

In fact it has led to the contrary, with FS practitioners often being asked to work inappropriately due to a lack of understanding about how young children learn effectively. There has been no improvement in continuity as a result of the FS being included in the Strategy documents, thus it should be removed.

It is simply not good enough any more to say - or imply - that the role in R is for children to be 'prepared for' the whole class maths lesson in Y1. We should be focusing on building life-long learners, and that requires we address the different learning styles children use. We are aware of no evidence that under 7s learn best by having whole class objective-led maths lessons, led by adults, every day. In fact, quite the opposite (reference EPPE research).

Finally, the new Early Years FS Framework is under consultation now, to be in place from

2008. We would anticipate that both those involved in this and those involved in the consultation and review of the Primary Strategy will be working together to produce materials that describe a continuous learning journey for our children, 0 - 11. However, despite much talk about 'joined up thinking', we question whether this is happening in practice. The DfES early years consultation states that the new primary strategy is to underpin the FS. It is critical that the new primary strategy does not determine what the FS looks like, simply because it is to be in place prior to the new FS guidance. The FS needs to underpin the primary strategy and any documents should reflect this.

We do have reservations about the current headings within the foundation stage. We believe any professional would agree that the development of mathematical understanding and thinking skills is critical and any curriculum document, however organised, needs to reflect this.

The Framework

The key objectives are thought to be useful. It would be useful if the objectives in sections 5 & 6 were more explicitly linked to the examples shown. Perhaps these 'objectives' are simply too broad and consideration be given to altering them to look more like the 'learning outcomes' used in the unit plans.

Concern has been expressed about the transition from the foundation stage to year 1. There is a danger that children move from an environment where their mathematics is embedded in practical experience, to sitting at desks and doing 'sums' that are unconnected to any practical work. Whilst there is a need for children to learn to write in mathematics, it is thought that the practical work needs to be encouraged more explicitly in the framework.

Multiplication and division is a glaring omission from year 1. Much of the practical work in the foundation stage is based around multiplication and division. The children are able to solve problems practically. There is then no multiplication or division in year 1. It is little wonder then, that problems in multiplication and division manifest themselves later on. There is a tremendous amount of language of multiplication and division introduced in year 2. It is thought that this would be better spread across the two year groups.

The approach to calculation for mental arithmetic is clear. However the idea of 'jottings' has not been clarified. Number lines, and other such models, can greatly enhance pupils' understanding of fundamental mathematical concepts about the number system. In order for teachers to fully realise their potential, the framework should include more specific examples of how these models can be used in varied ways from early years right through to extending Year 6 work.

The approach to written calculation is very unclear. Messages from consultants have been mixed with many teachers believing that they have to teach all the exemplified methods, leaving the children to choose their preferred method. This seems like a waste of valuable mathematics time. Some schools are using complementary addition and then using decomposition to 'stretch' the higher attaining pupils under some misconception that one

method is better than another. Others believe that one method leads on to another. Many schools are using the complementary addition method for subtraction - why keep the other methods in the framework? It is not clear in the framework that a written method of calculation is a means to an end.

Children are encouraged to use the correct language for naming numbers using place value cards from year 1. The grid method of multiplication allows the correct language to be used and for the teacher and pupils to be very clear about what (if anything) has gone wrong in a calculation. There is a clear link with the grid method which can be used in KS3 for expanding brackets. Is there any advantage to be gained by using any other method? The old standard written method is inappropriate as the correct language becomes clumsy.

Division is messy. The standard written method (bus shelter) is exemplified in the Y6 supplement of examples, but not in Year 7. The 3 + 2 course has a whole day on division, but still does not come up with any answers. Teachers are encouraged to do division by 'chunking' down. But if they're doing complementary addition for subtraction shouldn't they be 'chunking' up? This would also link with what is done mentally making connections with multiplication tables. The notion of multiplication as repeated addition, and division as repeated subtraction, doesn't tell the whole story and needs further consideration.

The whole issue of ratio and proportion and the definitions needs to be considered. At present it is a bit like saying 'you always take the smaller number from the larger' - the definitions are setting up later problems in understanding the structure. The notion that fractions are always part to whole does not sit comfortably with the type comparisons that children frequently make - 'It's not fair - I've only got half as many sweets as you'.

Consideration needs to be given to teaching the division aspect of fractions. Perhaps this should be left until KS3 and the notion of counting and multiplying eg 3 'lots of $\frac{1}{4}$ rather than $\frac{1}{4}$ of 3 used in KS2. This might well prevent later misconceptions when adding fractions - if you can count when the denominator is the same you must be able to add, but not when the denominators are different.

There is a lack of rigor in the Shape and Space sections of the framework. The existing structure and content appears to be an after thought or add-on instead of an integral part of the framework. There appears to be no coherent approach to geometry in the framework, just vague references to shape and space. There is no emphasis on practical application and little emphasis on spatial reasoning. 3D shape ignores the Platonic solids even though reference is made to the names of four of them within the framework, but in total isolation. Non-specialist teachers can easily miss connections like this if not offered this sort of rigor in the framework.

Cross-curricular links. It would be useful to see a far greater emphasis on possible links with other subjects throughout the framework.

Guidance on the way modules link

Teacher subject knowledge and understanding can be in issue. For example in key stage 1 it is important for children to be able to partition numbers - often called for example 'the

story of seven'. If you talk to many teachers about partitioning they would only consider partitioning into 10s and 1s, not partitioning 7 into 3 and 4. They clearly know why the children need to partition into 10s and 1s and remember to teach it. Do they understand why children need to partition in other ways? Some training on this would be extremely valuable.

Generally unless teachers have taught in several different year groups they have little understanding of the way the areas are linked. Those working as consultants or in HEI usually have a good understanding of the framework as a whole and of the interdependency between numbers and the number system, calculation and measures and how they each support the development of the other. It is important that teachers have this overview of what is there rather than just working on the little bits of objectives. The Five-day course began to address this, but funding for this has not been available in recent years.

Would it be possible to include some detail in the framework, or a separate booklet detailing why certain pieces of mathematical learning are important?

The principle of the Framework has contributed to teacher confidence in mathematics pedagogy which ATM celebrates - however the message that mathematics is a linear process of lots of small learning objectives is not one that ATM supports. More emphasis needs to be communicated in the Framework to help non-specialists see that mathematics is a way of thinking. Attention needs to be paid as to how to help both Teachers and children enjoy mathematics avoiding the dull uniformity of *always* having a three-part lesson.

The Primary Curriculum Group

ATM

January 2006

01332 346599

© ATM and others

copyright@atm.org.uk

The attached document has been downloaded or otherwise acquired from the website of the Association of Teachers of Mathematics (ATM) at www.atm.org.uk

Legitimate uses of this document include printing of one copy for personal use, reasonable duplication for academic and educational purposes. It may not be used for any other purpose in any way that may be deleterious to the work, aims, principles or ends of ATM.

Neither the original electronic or digital version nor this paper version, no matter by whom or in what form it is reproduced, may be re-published, transmitted electronically or digitally, projected or otherwise used outside the above standard copyright permissions. The electronic or digital version may not be uploaded to a website or other server. In addition to the evident watermark the files are digitally watermarked such that they can be found on the Internet wherever they may be posted.

Any copies of this document MUST be accompanied by a copy of this page in its entirety.

If you want to reproduce this document beyond the restricted permissions here, then application MUST be made for EXPRESS permission to copyright@atm.org.uk

*This is the usual
copyright stuff -
but it's as well to
check it out...*



The work that went into the research, production and preparation of this document has to be supported somehow.

ATM receives its financing from only two principle sources: membership subscriptions and sales of books, software and other resources.

Membership of the ATM will help you through

*Now, this bit is
important - you
must read this*

- Six issues per year of a professional journal, which focus on the learning and teaching of maths. Ideas for the classroom, personal experiences and shared thoughts about developing learners' understanding.
- Professional development courses tailored to your needs. Agree the content with us and we do the rest.
- Easter conference, which brings together teachers interested in learning and teaching mathematics, with excellent speakers and workshops and seminars led by experienced facilitators.
- Regular e-newsletters keeping you up to date with developments in the learning and teaching of mathematics.
- Generous discounts on a wide range of publications and software.
- A network of mathematics educators around the United Kingdom to share good practice or ask advice.
- Active campaigning. The ATM campaigns at all levels towards: encouraging increased understanding and enjoyment of mathematics; encouraging increased understanding of how people learn mathematics; encouraging the sharing and evaluation of teaching and learning strategies and practices; promoting the exploration of new ideas and possibilities and initiating and contributing to discussion of and developments in mathematics education at all levels.
- Representation on national bodies helping to formulate policy in mathematics education.
- Software demonstrations by arrangement.

Personal members get the following additional benefits:

- Access to a members only part of the popular ATM website giving you access to sample materials and up to date information.
- Advice on resources, curriculum development and current research relating to mathematics education.
- Optional membership of a working group being inspired by working with other colleagues on a specific project.
- Special rates at the annual conference
- Information about current legislation relating to your job.
- Tax deductible personal subscription, making it even better value

Additional benefits

The ATM is constantly looking to improve the benefits for members. Please visit www.atm.org.uk regularly for new details.

LINK: www.atm.org.uk/join/index.html