ANOTHER LOOK AT REVISION

Colin Foster

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The first time I taught a revision lesson, it was a disaster – one of those lessons you wish you could forget! I had cut and pasted together a sheet of miscellaneous problems and handed them out. The pupils worked quietly for about five minutes. Then a hand went up, then another and another. I hurried from person to person dealing with completely different enquiries. Within a few more minutes almost every hand in the room was in the air, all with different difficulties. Everyone had found something they were stuck on and it was my job to sort it out. (In the meantime the noise went up and the behaviour went down).

Since that memorable lesson, I have struggled to find effective ways of revising mathematics that has been taught previously and either learnt or not (or, more often, partially learnt). Of course, mathematics is full of connections, and we often find ourselves revisiting one topic while apparently pursuing another. Perhaps that is the best way to revise, but here I am talking about situations where we are deliberately rehearsing particular skills, perhaps in preparation for a forthcoming exam. In a revision lesson, the range of competence can be enormous, from the pupil who mastered the ideas when we did it and tackled challenging extension tasks, to the pupil who was absent (in body or in mind!) for those lessons and isn't sure what it's even about. Whole-class teaching which is aimed at the 'median pupil' can be particularly ineffective. Yet individual learning from a book (even a 'revision book'), though apparently giving each pupil the opportunity to focus on what he/she has found troublesome, is rarely successful: if the ideas have caused difficulties in the past, a re-reading of the textbook is unlikely to make everything clear. Both of the approaches I am going to describe tried to exploit the different abilities of the pupils in the class, rather than view it as a problem, by provoking peer discussion.

I envied them the luxury of spending 80 minutes on collaborative preparation for a single lesson!

I wanted my Y8 class to review operations with negative numbers, and I believe that one of the best ways to understand something is to teach it to somebody else, so I told them this and asked them to plan an introductory lesson on negative numbers for a Y7 class. We discussed as a class what prior knowledge and skills a Y7 pupil might bring to such a lesson and the need to cater for the extremes of the ability range. I proposed quite an ambitious objective (Pupils should be able to order, add, subtract, multiply and divide pairs of negative numbers without a calculator.[1]), commenting that this would be an objective for a sequence of lessons and that they should choose how much they would tackle in the first lesson. (I left open such issues as the magnitude of the numbers or whether fractions or decimals were included.) It would be my task to continue from where they left off in subsequent lessons. The task was to prepare a lesson plan and be ready to perform the lesson (or describe it) to the rest of the class. We would choose one group who would actually come and teach my Y7 class the following week.

The pupils were very motivated by the idea and enthusiastic about the responsibility of being 'experts' to a Y7 class (and the chance of missing a geography lesson!). They worked in small groups for two 40-minute periods, designing their lessons and making resources such as bingo cards, 'battleships'-type games and traditional worksheets. (Watching them, I envied them the luxury of spending 80 minutes on collaborative preparation for a single lesson!) Some groups drew very heavily on ideas they had seen a year ago (when they were in my Y7 class). Others went for a very transmission-teaching style ("We're going to tell them this and then tell them that and then they'll be able to do it and if they have any questions we'll answer them," etc.), and when I commented on that, they said they preferred to learn that way. I mostly restricted my influence to asking "What if . . .?" questions so that they would feel prepared for how the pupils might respond, and on practicalities such as being realistic regarding time and resources. It was good to see

pupils arguing about each other's explanations, trying for instance to justify when 'two minuses make a plus' and when they don't (eg, 2 3 2 2 5 2 5, not 1 5). There was a lot of very productive discussion and much checking with calculators.

It was very hard to choose the 'best' group, but in the end we selected a group of three pupils, and when it came to the lesson itself I sat at the back pretending to be an inspector and interfered only once to warn them that the time was nearly up. The lesson was very enjoyable for all, even though the teachers were quite nervous. It was particularly interesting to see the way the Y8s dealt with questions from the Y7s, often using more pupil-friendly language than I would have done and relying more on examples and less on generalities or rules. I learnt something from that. I noticed that the Y7s spoke in a more relaxed way to their peer-teachers than they would have done with me, but perhaps asked for help less. In general, Y8 underestimated the ability of the class, but the Y7 pupils could see that and it boosted their confidence to some extent, particularly when the Y8s made some small mistakes. Several Y7s asked at the end if they could have a go next year!

My other excursion into peer teaching as a way of tackling revision was with a Y9 class. This time I gave them a list of the main lesson objectives for the year so far and asked them to design a fair test of those skills. They could use textbooks to remind themselves what they were expected to be able to do, and for ideas of questions or problems, but I hoped (and said so) that they would produce more interesting tasks than the short closed questions which dominate the book. They each decided at the start whether their's would be a calculator or non-calculator test and wrote that at the top of the page. They wrote a mark-scheme in their books and decided how the marks should be allocated. Some indicated that on their papers, and others chose not to. They worked with considerable interest and enthusiasm, taking the task very seriously. At the end I collected in the exam papers, looked through them and distributed them fairly randomly, though taking care with any obviously long or difficult ones. A few pupils prided themselves on devising 'difficult' exams, but most were very fair and hit what seemed to be about the right level of challenge. (The necessity of making a mark-scheme as they went along prevented too many excessively long or difficult questions!)

There was much excitement over who would get whose paper. One homework was to do the exam (it was left up to them how strictly or not to abide by 'exam conditions'), and the next homework was to retrieve their paper and mark it, offering some positive constructive comments to the candidate. On these occasions, there were no problems with uncompleted homework. I then collected everything in and looked at it.

Several pupils said that they had found the process valuable and that setting questions had forced them to think more deeply about the topics. Setting some questions involved quite different skills (sometimes easier, sometimes harder and sometimes just different) from those needed to answer them. For example, pupils who could accurately substitute numbers into equations could invent quite difficult-looking linear equations by beginning with the value of the unknown and then constructing the equation. Other questions, such as ratio on a non-calculator paper, seemed to take more thought to set than to solve.

A change of perspective is frequently healthy, and the experience of setting and marking an exam may lead pupils to appreciate more the work we do for them: "You only had one to mark – I have thirty-one!"

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Reference

1 DfES: ***Key Stage 3 National Strategy, Framework for teaching mathematics: Years 7, 8 and 9***; DfES, 2001, pages 48-51

MATHS TALK

Paula Ross

The 2003 primary national strategy's speaking, listening and learning document [1] emphasises the need for children to learn to:

- use exploratory language to try out ideas
- stretch their language as they talk constructively and critically
- support and build on each other's contributions

as well as using talk in different ways, such as discussing, hypothesising, agreeing and disagreeing, questioning and reflecting.

I have never underestimated the power of 'maths talk' as a tool for children to develop understanding of their mathematics and I am always looking out for interesting ways of developing group discussion and interaction.

Having used talk-groups with my Y6 class who are given various roles, such as chairperson, developer,

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