TO MIX OR NOT TO MIX?

Rosemary Shuttlewood partially mixes her ability sets to encourage well motivated pupils to inspire those with a more negative view of mathematics.

The mixed independent school in which I work, has 80–90 girls and boys in each year, split into four or five ability sets. The sets are decided primarily either by pupil achievement in the entrance examinations prior to Y9 or by pupil performance in the prep school. The ‘top’ sets have a maximum of 26 pupils, gradually reducing in number, down to about 10 in the ‘lowest’ set. Sets 1 and 2 and some of set 3 enter at GCSE Higher level, targeted at A and A* and sets 3, 4 and 5 enter at GCSE Intermediate level, aiming at grades B and C. Some pupils may achieve grade D, or occasionally E.

A successful set 1 revision lesson for the mock GCSE provided the initial inspiration for this experiment, together with my reading for an OU course which included Jo Boaler’s Setting, social class and survival of the quickest. The class had produced their list of key topics needing revision, (such as probability, cumulative frequency, vectors, and quadratic equations) and the 24 pupils were grouped in pairs. Each pair was given a coloured A4 page with a topic and a text book reference, on which to produce a concise and easy-to-read summary of the basics of their given topic. The class brainstormed what would be most useful: facts, formulae, ‘hard bits’, examples, definitions, contexts of problems etc and they were encouraged to help each other when stuck. Pairs then swapped sheets with another pair, checking for sense and accuracy and some pairs presented their results to the class. Comments such as ‘I never understood algebraic fractions before’ and ‘So that’s why you do cumulative frequency’, showed that real progress in knowledge and understanding had been made.

This idea was adapted and extended to the whole of Y11, during the month after Easter when classes were mainly consolidating, practising and revising in preparation for the GCSE examinations. All pupils were told that a change in routine would help to make this revision period more interesting and energising for both pupils and teachers and that by mixing up the classes, we hoped that pupils would share their expertise with each other and enjoy working with someone different. The weekly plan for the five lessons was debated and agreed during a departmental meeting just before Easter, allowing staff to share ideas, work together and to finalise details over the holiday. The four weeks were focussed on number, algebra, shape and space, statistics and probability.

Mondays

Sets 1 and 2 were packed into the largest classroom and one teacher presented a ‘lecture’ whilst the other provided support. In the first session, pupils were reminded of ‘surds’, estimation, percentages, ratio, etc and then involved in solving typical higher-level problems in these areas. The practicalities alone made this session a challenge: keeping 50 plus pupils on task when half had to first collect their chairs and settle themselves at too few tables was not easy. However the individual whiteboards were useful for instant feedback and the majority of the pupils participated in the lesson and enjoyed the competitive element of working with a friend to be first pair with the correct solution.

Sets 3, 4 and 5 were combined to watch an intermediate level mathematics video1. These videos were perceived by some pupils as having dubious value, but at the very least they provided a change. Some pupils remained very focused to the end and most gained something from this different approach. The varying lesson styles ‘disrupted poor behaviour patterns and avoided the usual end-of-term idleness’, according to the teacher of set 4. He also enjoyed the team approach and the

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support of the whole department at what can be a difficult and dispiriting time.

Staff generally appreciated the opportunity to plan and work together and to share experiences of the pupils’ progress and behaviour.

**Tuesdays**

The usual class lesson for sets 2–5 allowed pupils to cover the last parts of the syllabus and to fully investigate any difficulties highlighted on the Mondays.

Set 1 were given an extension lesson, being introduced to some of the ideas they would soon be meeting at AS level. This helped to stretch the most able, some of whom were regularly achieving 85-95% on practice GCSE papers. Topics were chosen to link with and extend the GCSE work: numerical long division extended to algebraic, indices to logarithms and trigonometry in right angled triangles to angles of any size.

**Wednesdays**

Normal classes for all; set 1 particularly appreciated the opportunity to address some of their individual problems, as well as having whole class discussions on particular topics.

**Fridays (double lesson)**

This was very similar to the original task. Sets 1 and 2 were split and half of each class were sent to the other classroom, where the ‘home pupils’ sat one per double desk, so that each pair consisted of one pupil from each set. The topics from that week’s focus, plus a text page reference were given to each pair, who together produced an A4 summary sheet. As all the set 1 pupils were familiar with this idea and were convinced of its benefit, it was easy to involve the set 2 pupils. Sets 3 and 4 worked together in the same way. When the sheets were finished, admired and shared there was a short break so the class teachers could swap rooms, ensuring that all pupils had their own teacher for half of this double lesson.

During the second half of the lesson, we provided each pair of pupils with relevant topic problems, A/A* for the top two sets and B/C level for the other sets. The pupils worked together to solve as many problems as they could, and they were encouraged to explain their thinking to each other, and to produce joint agreed solutions. Some answers and feedback were given at the end of the lesson, and pupils were required to complete the solutions for homework.

**Feedback from the set 1 pupils**

Some of the set 1 pupils were rather vocal in their disapproval of the changes and I wanted to give them the opportunity to articulate their thoughts in a calm and positive manner. I also wanted to see how widespread the dissatification was and to understand their worries. So, after two weeks the set 1 pupils were asked to complete a questionnaire honestly and anonymously to find out their reactions to this new structure. Since they are successful with the usual lessons, it would not be surprising if they are fairly negative about any changes in routine. The pupils in set 2 were not given this questionnaire, as they seemed more than happy for the experiment to continue for the full 4 weeks.

The pupil responses were varied, but most were remarkably positive and several expressed their relief at having their views sought and listened to. The Monday lectures for set 1 and 2 were perceived as being fairly chaotic, but positive comments included:
- a reminder of topics and helped with revision
- good interactive learning with whiteboards and pens
- learning different methods and sharing ideas
- nice change of pace
- makes me realise what I need to do, eg, ‘surds’

The negative remarks generally involved the distraction of the large number of pupils. Some commented that ‘set 2 need discipline.’

Tuesday’s ‘stretching’ session was positively viewed by some with encouraging comments such as:
- a very useful introduction to A level
- a challenging but interesting break from revision
- by understanding harder topics, actual GCSE topics are made easy and this boosts confidence

Others clearly found them a little distracting when they had their own agendas:
- for some it is wasting revision time
- better to concentrate on getting more confident about topics on the GCSE syllabus, rather than do topics that are not on the syllabus
- people may start panicking about things they didn’t need to know
- confusing.

We realised that it was maybe too late to introduce all these changes at once, just when the pupils were getting nervous about the approaching GCSEs and needed to have their confidence increased. In future, we intend to mix classes regularly throughout years 9, 10 and 11. That way, this type of mixed revision schedule will be far less threatening.

Wednesday’s usual revision lesson was very well received; typical comments included:
Future plans

Following these successful sessions, we intend to be far more flexible with the ability sets. We are planning to have two parallel top sets, two parallel middle sets and probably one small lower set. We will get sets together regularly, for specific topics, or for mixed revision as described. We are hopeful that the GCSE results this August will justify this experiment and may show that some of set 2 have improved their grades or even just adopted a more positive approach, without jeopardising the high results of the most able.

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Postscript

We were delighted with the 2005 GCSE results for set 1:
16 pupils achieved grade A*, 7 grade A and 1 grade B. This showed that our confidence in the ability of set 1 was not misplaced, and justified the attempt to ‘infect’ the set 2 pupils with the set 1 positive ‘can do’ attitude. Disappointingly, no pupils in set 2 achieved an A* grade, although several came very close and there were 13 grade A, and 11 grade B. This fitted with our opinion that the experiment may have been ‘too little, too late’. Another positive effect however may be the unexpectedly high take up of mathematics in Y12, and the retention of all these pupils. We have 3 pupils studying further mathematics and 24 studying mathematics, our highest total for several years, with the vast majority from sets 1 and 2. As these 24 pupils are taught in two mixed ability groups, the experience of mixing them in Y11 has helped them to bond together more quickly in Y12. It has been useful for the Y12 teachers too, who knew more pupils than just those from their own Y11 set. In Y9 and Y10 we have changed the setting to parallel sets 1 and 2, plus a lower set. Although it will take time for any repercussions to become clear, so far there are no difficulties. My feeling is that the behaviour and standard of the less able and less motivated pupils is continually being stretched by the consistent good example of the high-achievers.

Reference


Note

1 The videos were from Channel 4’s Maths4Real and Maths4Real2 series.
www.abc.net.au/schoolstv/series/Maths4REAL.htm

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