Secondary Magazine Issue 50

National Centre for Excellence in the Teaching of Mathematics

Happy New Year and welcome to Issue 50 of the Secondary Magazine. In this Issue there is plenty of mathematical champagne and candles as we start a new decade and celebrate in style – at a Straw Bear Festival?

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From the editor – New Year's Resolutions

I don't know about you, but working in education, I feel that I get two bites of the cherry when it comes to New Year's resolutions. I start each September with grand intentions which inevitably fade a bit as the pressure of the term starts to hit in, but then there is January 1st when the rest of the world starts to focus its attention on resolutions for the New Year which seems to have the effect of re-focussing me.

In Issue 41 I wrote about some of my resolutions for this academic year, so it is timely to revisit those intentions in the spirit of reflecting on my successes and making an 'even better if' list! So what was it that I set out to do at the end of August? I said I would:

1. spend time building up good relationships with pupils
2. make sure my pupils are active learners with a relevant curriculum
3. question new initiatives – how will they make a difference to my pupils?
4. engage in personal CPD activities
5. get a life!

So how have I done?

Spend time building up good relationships with pupils
This is the one area that I will give my self an 'A' grade for – how can I not relate to the super young people with whom I share mathematics? If I am looking for something else to work on, then it will be making time for colleagues, especially those not in the mathematics department.

Make sure my pupils are active learners with a relevant curriculum
Did you use the Who killed Santa? resource in Issue 48? I have been trying to use rich tasks and activities in lessons so that my pupils are actively engaged in their mathematics. I think (and hope as well really) that I will never have finished this resolution – there will always be other things I can work on or think about to improve the learning experience for pupils in my school.

Question new initiatives – how will they make a difference to my pupils?
Having found out a bit more about Functional Skills this term, and having engaged in a trawl through the new GCSE specifications, I feel very positive about the things that are about to happen to GCSE mathematics and the 'changes' that we will be making to our teaching to ensure success at GCSE. It seems that everything is puling in the same direction – to give pupils the opportunity to become more active learners who make connections within their mathematics. That's got to be good!

Engage in personal CPD activities

I have been reading some of the entries on the new NCETM microsite Building a Picture of Professional Development. The entries describe teachers' CPD experiences. There is a rich and varied selection of personal CPD stories which have stimulated my interest and inspired me to engage in my own CPD in 2010. I did attend the NCETM conference Engaging with mathematics: A journey for teachers, learners and families, and was inspired by Professor Ainley's talk.

Get a life!

Well – the yoga has happened. It's a great discipline having to be there every Wednesday at 7:30. I'm enrolled for next term so I hope those 'sun salutations' and dynamic cat routines keep my body flexible which seems harder than staying flexible in my mind – so far!

What are your New Year's Resolutions? Why not share them with us here?

Up2d8 Maths

The fortnightly Up2d8 Maths resources explore a range of mathematical themes in a topical context. The resource is not intended to be a set of instructions but rather a framework which you can personalise to fit your classroom and your learners.

The National Weights and Measures Laboratory is just coming to the end of a consultation period which could see a new measure introduced to pubs and licensed premises. It's argued that the new two-thirds of a pint measure would provide customers with more choice, particularly when ordering drinks with a high alcohol content. This resource encourages students to explore the safe drinking recommendations and, in doing so, develop their understanding of fractions.

The activity explores adding fractions (halves and thirds) using the context of legal measures in UK pubs. The task is for students to use the images to explore ways in which they can make amounts equal to, or less than, one and a half – which represents approximately the Government's advice for the maximum number of pints of 4% beer that can be consumed in an average day. The activity is designed to be used at the beginning of some work on fractions, with the students experimenting and generating their own strategies for combining fractions.

This resource is not year group specific and so will need to be read through and possibly adapted before use. The way in which you choose to use the resource will enable your learners to access some of the Key Processes from the Key Stage 3 Programme of Study.

Download the Up2d8 Maths resource - in PowerPoint format.

The Interview

Name: Niall Wrafter

About you: I work for a large American global IT corporation offering hardware and services.

The most recent use of mathematics in your job was... IP addresses, the addressing system applied to all participating computers in the internet. At the simplest level, each computer has an IP address in the format: xxx.xxx.xxx.xxx which could be from 0.0.0.1 to 255.255.255.255 or 00000000.00000000.00000000.00000001 to 11111111.11111111.11111111.11111111 in binary, ie. it is a 32 bit number, which effectively means there are 2 (to the 32th) available network addresses in the world, ie. around 4 billion. These addresses are rapidly running out, so a new version of IP addressing is out which has 2 (to the 128 addresses) ie. a lot more.
An example of a typical IP address is 172.16.254.1 which in binary would read 10101100. 00010000. 11111110. 00000001.

Some mathematics that amazed you is... the golden mean (or "golden ratio"), 1.618, which applies to mathematics and architecture.

Why mathematics? There's always a right answer.

Your favourite/most significant mathematics-related anecdote is…
apparently 4 out of 3 adults have trouble with fractions.

A maths joke that makes you laugh is…
what does the zero say to the eight ? Nice belt!

Something else that makes you laugh is… Harry Hill's TV Burp

Your favourite television programme is… Harry Hill's TV Burp

Your favourite ice-cream flavour is… Wall's Viennetta.

Who inspired you? Erm, Harry Hill.

If you weren't doing this job you would… be outdoors.

Focus on…Fifty

- The word 'fifty', according to the Merriam-Webster dictionary, is derived from the old English word *fiftig*. *Fif* meaning five and *tig* meaning group of 10.

- $50 = 5 \times 10$, and 5 and 10 are the two smallest numbers that are each the sum of two squares.

- 50 is the smallest number that can be written as the sum of two squares in two different ways:

  $50 = 1^2 + 7^2$
  $50 = 5^2 + 5^2$

  The next few are 65, 85, 125 and 130. 65 is the first that can be written so that all of the squares are different.

- 50 is also the sum of three consecutive square numbers:

  $50 = 3^2 + 4^2 + 5^2$

- 50 is a Harshad Number, that is, it is a number that can be exactly divided by the sum of its digits:

  $5 + 0 = 5$ and $50 \div 5$ is an integer

  In 1994, Helen Grundman showed that there is no sequence of more than 20 consecutive Harshad Numbers. She also found the smallest sequence of 20 consecutive Harshad numbers, each member of which has 44 363 342 786 digits.

- 50% = ½ = 0.5 which often leads to 50% being an introduction to percentages and fractions. The Maths4Life Fractions booklet suggests a resource in which students are invited to draw diagrams of as many different halves they can think of and to write down calculations to show you can calculate half of anything.

- There are 50 states in the USA. The name of the television programme Hawaii Five-O was taken from the fact that Hawaii is the 50th state.

- There have been 50 editions of the NCETM Secondary Magazine so far! The first ten looked very different to this one and included department workshops which colleagues might work through together. The format changed again in Issue 21 which is also the issue in which the first Up2d8 resource was included.
  What would you like to see in the next 50 editions? Leave a comment and let us know.

An idea for the classroom – adapting an existing activity

We have previously looked at the great set of 'mysteries' to use in the classroom produced by Durham LA.

Working with a colleague recently, we were looking at the 'ratio and proportion' mystery. It is just the sort of activity we want to be doing in school to give pupils access to the Process Skills in the Key Stage 3 programme of study which will also prepare them for the functionality part of the new GCSE, but this activity is just too difficult for a bottom set of Year 8 pupils. We decided that we would take the ideas from the mystery and adapt it for this specific group of pupils – but what would we change?

I have heard colleagues say things like 'It's OK to do these activities with top sets, but bottom sets will never be able to do this sort of activity' – but these bottom sets also have an entitlement to access the Process Skills. So, we needed to change the mathematical content of the activity and reduce its complexity without making it a pointless task. Perhaps it's helpful to think of a same/different comparison of the activities.

Same would include:

- lots of cards
- all the information needed is given on the cards, no teacher instruction needed
- the mystery is organised in the same way
- it is a closed task with an answer.

Different would include:

- easier fractions and decimals to work with
- having a set of cards for the core task, with further cards as an extension activity (which makes the answer change)
- the possibility of giving pupils a grid to record their answers.

(We argued a lot about this last point – by giving pupils a grid the complexity is considerably reduced. I am in favour of having the grid to hand as a support for those who struggle – but I want them all to struggle for a while and I might suggest that they design a grid before I use the one I have designed for those who don't sort themselves out).

So were we successful? Why not try this out yourself and tell us about it? Alternatively, have you adapted an existing activity to cater for less able pupils? Why not tell us about it here?

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5 things to do this fortnight

- Are you a subject leader looking for some inspiration? Maybe you're thinking of applying for a subject leader post when the adverts start appearing? Why not have a look at the new Excellence in Mathematics Leadership microsite which explores some of the key elements of subject leadership and core responsibilities of this demanding role. It offers a flexible and stimulating way to review where you are now, plan some next steps, and learn from the experiences of other subject leaders through a set of case studies and 'stories of change'.

- Everything we buy, from books to baked beans, has a product code printed on it. More sophisticated check-digit codes exist on official documents, bank notes and air tickets. What are they for and what do they mean? This free lecture, Codebreaking in everyday life, at the Museum of London, will look at the mathematical structure of these codes and explain their purposes. And in this age of boundless surveillance, are there enough numbers for each of us to have a serial number of our own?

- Teachers who work with others on developing their practice play an invaluable role in supporting the professional development of their colleagues and improving the experience for learners. They are also key figures in developing innovation, creativity and new teaching and learning approaches in schools and colleges. However, they often have limited opportunity to discuss and share practice with similar colleagues.
  The National Centre is holding six national Influence and Impact Conferences in January and February 2010, in locations from Newcastle to Exeter. Come and take part in workshops and discussions and listen to the experiences of peers about ways of working with others and the benefits of collaboration.

- Get ahead of the game and book your place on the MA's annual Yorkshire and Humberside Mathematics Professional Development Day.
  This one-day professional development event takes place on 1 March 2010 at The Royal York Hotel and aims to support teachers to embrace the aims of the new secondary mathematics curriculum through new tasks and teaching approaches.
  More information can be found by downloading the programme and bookings can be made by e-mailing conference@m-a.org.uk.

- In Whittlesea, it was the custom (since when no one quite knows) on the Tuesday following Plough Monday (the first Monday after Twelfth Night) to dress one of the confraternity of the plough in straw and call him a 'Straw Bear'. A newspaper of 1882 reports that "...he was then taken around the town to entertain by his frantic and clumsy gestures the good folk who had on the previous day subscribed to the rustics, a spread of beer, tobacco and beef."
  If you enjoy a 'spread of beer, tobacco and beef' then make sure you get to the Whittlesea Straw Bear Festival, which takes place on 15, 16 and 17 January where there will be a variety of events before the Sunday burning.

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Diary of a subject leader

Real issues in the life of a fictional Subject Leader

One of the best aspects of being committed to the deadline of writing this diary, is that I know I have to look for inspiration from my day-to-day life. One of the worst is that I actually have to write it!

So here is how it happened this week...

Totally mad week at school. Used my only two non-contacts (which were supposed to be PPA) and three hours after school dealing with a year 11 student who has never engaged, and was now complaining that I was a "rubbish" teacher. Aware there was much ground to restore, I used our all-new, restorative approaches pathway to deal with this. In short, that was goodbye to five hours of my life. It pulled in three other senior members of staff for two hours each, but eventually resolved with a frank and honest admission from the mother that her daughter was being completely unreasonable – if I was to blame it was for being too understanding of her daughter when she first made the complaint! Add to this, a day of interviews for a new mathematics teacher, a three-hour Senior Team Meeting, a Year 11 parents' evening and then finally a 90-minute department work scrutiny focussing on assessment straight after last lesson on Friday and you can probably guess I didn't do much marking this week...

So, when my great uncle visited for a 70th birthday celebration weekend, and having cooked lunch and dinner for 14, my heart was not quite in my marking on Saturday night. My great-aunt's heart really is in the right place however. She provided a lovely hot cup of tea, and sorted out the chicken stock that was still simmering on the hob.

And why is this all-important? Well, she used to be a primary school teacher in Mid Wales, and really empathised with my plight, but not in a patronising way. She understood that because marking was routine and, compared to other issues, often non-urgent, it too often gets pushed to the back of the pile. All too often it becomes "the last thing to do". Hence my marking on a Saturday night when I could have (should have?) been celebrating. (As it happens, celebrations in my family all too often become argumentative debates on the intellectual poverty of maths and science students compared to overseas students and or that 'education managers' are useless and a total waste of space. My marking was actually the more appealing option.)

My great aunt described how she used to mark students' work in her evenings, and that what she enjoyed most about her evenings, now that she was retired, was that she had evenings. However, she did not resent the many evenings she had spent marking. She genuinely believed that the assessments she made through her marking made a real difference to the progress of her students, even more so on the occasions when she was able to share her students' strengths and weaknesses with colleagues in her school.

The chat with my great aunt made me think back to our work scrutiny the evening before. We did talk about self marking and peer marking but this was only one section out of seven on the pro-forma we needed to complete. By far the majority of the "scrutiny" interrogated our team's frequency of marking, use of praise, provision of individual curriculum targets for students and frequent correction of errors. Fortunately our link SMT is a very hard working English teacher and that is instrumental in ensuring her team is successful in terms of GCSE grades. She has a very real experience of the pressure core subjects are under, and how that impacts the personal day-to-day life of a core subject teacher – and just like my great aunt, she knows that marking has a measurable impact on progress. However, often we were having to question, "Why do we do that?" Too often the response was "To tick the box".

I had real success in the first half term of this year using MP3 files and recording a 30-second report for some of my students as I marked their books. It was great, but it took time – too much. I don't do it now because it was not sustainable if I was to mark frequently. At the back of my mind, however, is an awareness that the quality was much better. Not because I was doing a better job, but because there was a desire and interest from students to engage – far more so than with a written comment.
So, as normal my inspiration this week is fuelled from dissatisfaction. I know I could improve my students' learning, but expectation and 'regulation' stop me from doing that. Most of all however, that chat with and 'old–school' teacher has made me re-evaluate what is really urgent in my working week.