Secondary Magazine 124

National Centre for Excellence in the Teaching of Mathematics

When you read this, you're probably nearer the end of the holiday than the beginning, so let this new issue of the Secondary Magazine cheer you up. Grab a piña colada from the poolside bar (or a mug of hot soup and an extra scarf if you're holidaying in the UK), pull up a deckchair and settle down with a slightly different set of articles this month: we're Building Bridges in person at maths conferences, Sixth Sense is looking into the future for students going off to college following their GCSE results, and the library is closed for the vacation so there's a dispatch From The Classroom instead. Altogether, more food for thought than a Cornetto!

Contents

Heads Up

Whilst not wanting to define this article as mathematical gossip, it does come close! We've brought together news and current mathematical affairs, all in one place. We do hope it will interest you.

The ever-interesting More or Less returned to BBC Radio 4 on Friday 14 August - and now you can download episodes via the iPlayer Radio App and listen to the programme anywhere you like (probably best not to do during the head teacher's beginning of term presentation).

If you're north (or nearly north) of the border, don't forget to visit The Amazing World of M. C. Escher at the Scottish National Gallery of Modern Art in Edinburgh before 27 September.

If you're thinking a redoing your bathroom, or if you're just interested in periodic tessellations of the plane without any home décor motivation, there's now a new pentagonal tile for your consideration, the first such found in over 30 years

Jo Morgan (@mathsjem) has put together a very handy list of Twitter conversations to put into your new academic diary from September. These are regular online discussions that centre on a theme or series of questions; anyone on Twitter can contribute.

To help teachers understand the principles of teaching for mastery, and implement the approach in the classroom, the NCETM has published new materials to support ongoing assessment of pupils' understanding of the mathematics National Curriculum. These materials are mainly for primary teachers, but the Y6 materials could be used diagnostically by KS3 teachers who want to ascertain how secure their pupils' conceptual understanding is, and also as a prompt for dialogue with feeder primary schools.

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Building Bridges…between people

Throughout the year there are maths conferences, Teach Meets, subject association annual forums, and many more such maths gatherings – often at a weekend. Why do teachers go? Is it just for the cake competitions and the cotton goody bags (does anyone need another branded cotton bag stuffed into that cupboard in the kitchen alongside the tealights and the scissors you buy every time you visit THAT Scandi-furniture behemoth?). Do you go to conferences? Tell us why, either by email to info@ncetm.org.uk, or @NCETMsecondary on Twitter.

Here, three regular attendees describe what for them are the attractions of conferences, and the associated benefit of joining a subject association. If you want to find out more, at the end there is a list of upcoming events.

Stephen Cavadino *is a maths teacher from Leeds who blogs at cavmaths.wordpress.com. When he isn't teaching, writing about or doing maths he spends the majority of his time with his family, watching rugby (both codes) and playing the guitar.*

The last few years have seen a veritable explosion in the amount of CPD that a keen teacher can access above and beyond that which is offered by their school. Driven by the Internet, many teachers come together regularly to discuss pedagogy, policy, leadership and research. As maths teachers we are particularly spoilt by the fact that, as well as the vast amount of general teacher events happening around the country, there is a huge amount of maths teacher-specific events cropping up. I have attended a great many of these events, both maths-specific and more general, and have found them all really informative, challenging and inspiring. I was asked why I thought this, and what I thought the benefits were for maths teachers of attending these conferences. Here's what I thought:

Maths-specific conferences

These events are fantastic for meeting fellow maths teachers and discussing resources, pedagogical approaches to certain topics, curriculum design, setting and all the other things you normally discuss with colleagues within your school and other networks. Working in a similar way to social media these give you access to many more maths teachers than you would normally come into contact with and I would say that this is a very big benefit of these maths specific conferences.

For me though, the biggest benefit of these subject specific conferences is the subject itself. I love maths, I teach maths because I love it and I want to inspire that love of the subject in others as my maths teachers did in me, and I love learning new things. At recent maths specific events I've seen talks by the likes of Marcus du Sautoy and Johnny Ball who both taught me something new and renewed my vigour to get in to the classroom and share the awe and wonder that is involved in mathematics.

The general events

The more general events have a different feel. These do have similar networking opportunities, but with teachers of all subjects rather than just maths. This in itself has advantages and disadvantages over the maths specific events. Obviously there is no benefit in discussing the

pedagogy you use while teaching Pythagoras' Theorem, for example, but aspects of classroom management are the same and there are plenty of pedagogical ideas that can be swapped and adapted across subjects. One idea I adapted recently from a discussion with an English teacher at a general teaching event revolves around the word wall from the BBC quiz show, *Only Connect*.

These conferences always have intriguing workshops based around research, policy and pedagogy and these can be inspiring. I try to choose my options wisely. Some speakers I will go to see knowing I will agree with everything they say because they will inspire me and reaffirm my passion to teach. Some speakers I will go and see because I have a genuine interest in the topic they are discussing, be it a piece of research or policy. And I will go to see some speakers, even though I know - or at least suspect - that I will disagree with them. This third group I choose because I feel we need to keep challenging our thinking and challenging the outlook we have. Either I re-evaluate the way I thought I was right in the first place and move on, or I re-evaluate and alter my practice because of a persuasive argument. Either way, it has made me think, and I hope I have become a better teacher because of it.

Jo Morgan *is the maths teacher who writes resourceaholic.com, a website providing ideas and resources for teaching secondary school maths.*

Maths teachers are fortunate to have access to a wide range of opportunities to develop their professional skills and knowledge. The development of blogging and social media as tools for CPD in education means that teachers are now better informed than ever before.

Although we can learn much from these online platforms, most teachers would agree that face-to-face CPD remains the most effective way of learning. In these times of austerity, attendance at external training courses and residential conferences has been cut by many schools. However, many national conferences for maths teachers are affordable (sometimes free) and convenient, taking place on Saturdays to avoid disruption to teaching. More than ever, maths teachers have control over their own learning and development.

Why attend?

It's said that a conference is worth attending if you take just one idea back to school which you successfully implement in your teaching. In reality, these conferences provide delegates with far more than just one new idea.

Delegates go back to school with new resources, new ways of explaining concepts and a clearer understanding of recent policies and practices in maths education. They hear about innovative approaches being taken by other schools and feel inspired to try new things. They leave full of ideas and excited to tell their colleagues about what they learnt. There's always a buzz in the air at the end of a maths conference.

There's something for everyone, from primary school teachers to A-level teachers. Workshops cover a plethora of topics, ranging from leadership strategies to lesson planning, from assessment to marking, from paper folding to bar modelling, from the history of mathematics to online resources.

It's common to feel nervous at the prospect of networking at conferences, but these events are always friendly and well structured. There's plenty to see and do including competitions and

exhibitions. There are also opportunities to meet new people and socialise with fellow maths teachers. Delegates come away feeling part of a supportive community.

If you've not attended a maths conference before, then try it: not only will you enjoy it, it will also be hugely beneficial to your teaching.

Why present?

Have you considered volunteering to run a workshop at a maths conference? Presenting for the first time may be a daunting prospect but if you have something relevant and interesting to talk about then you'll be warmly received. If you have a particular area of expertise, an innovative idea or a fresh approach, people will want to hear from you. This is an opportunity to make a difference in maths education beyond your own school. It's an incredibly rewarding experience. It's also an opportunity to challenge yourself and develop your own skills. If you have something to share, don't keep it a secret! Exchanging ideas is beneficial to everyone.

Melanie Muldowney *is one third of the trio that brings you justmaths.co.uk. She is currently Associate Subject Leader and on the Extended Leadership Team at Alcester Academy in Warwickshire, having previously worked at Trinity High School in Redditch during its journey from National Challenge to 'Most Improved School in England'.*

As Maths teachers we have a whole range of conferences and subject associations to choose from; however, it is sometimes difficult to see where they "fit" in the day to day grind of teaching when you are working flat out and the only thing that seems important are the outcomes for your students. Well, let me tell you … it is at these times that looking outside your own school for personal development becomes even more important.

Some of the events have a real "coal-face" ethos (these are the one where the most popular sessions are run by other practicing teachers) and others have historically tended to have a more research-led focus such as those from the Mathematical Association (MA), the Association of Teachers of Mathematics (ATM), and the Association of Mathematics Education Teachers (AMET). There is no such thing as not being "maths-y" enough – of course there will be people there that are more "into" the subject than others, but the rejuvenating effect of seeing so many enthusiastic people is difficult to describe in words. Everyone, without exception will be attending these events for their own specific reasons and you'll find everyone keen to help, encourage and support.

Here are my top five reasons to take the time to attend a maths conference:

1. Being around positive people is infectious and some of this will rub off on you or provide an antidote to those teaching blues that happen.
2. You get to meet and network with others who are interested in Maths and/or teaching Maths – this is a great morale booster and meeting other like-minded people is inspiring.
3. Apart from the "stuff" you'll discover in any workshops, talking to other teachers you'll find them more than willing to share ideas and strategies that work for them and so you'll probably pick up more new ideas than you'd first expected.
4. Often you will get to meet experts and leaders in our field face-to-face and conference speakers are usually available to chat and answer questions – most will even be more than happy for you to take a selfie with them!

5. It is all too easy to leave events like this, enthusiastic and motivated, only to get back into the classroom on Monday morning and find that all your good intentions fizzle out, which is why one of the biggest benefits of some of the events is the fact that time is dedicated to networking - there is a large number of the Tweeting Teacher community in attendance which means you also get to develop your own ongoing support network too (don't get me started on how amazing Twitter is!).

Regardless of what end of the "maths enthusiast" spectrum you would consider yourself to be, there will probably be times when you'll need reminding just how awesome teaching maths can be. Conferences allow you to pull over, slow down, stop… and reflect.

Coming soon...

Saturday 5 September
The 10th MA Conference for Teachers of Secondary Mathematics
Stirling
The Mathematical Association

Tuesday 8 - Wednesday 9 September
CETL-MSOR Conference 2015
London
Sigma Network

Saturday 26 September
National Mathematics Teacher Conference
Sheffield
La Salle Education

Thursday 22 October
English & Maths 2015: Effective Teaching Strategies to Meet New Accountabilities
London
Optimus Education

Saturday 5 March 2016
National Mathematics Teacher Conference
Peterborough
La Salle Education

Saturday 12 March 2016
Scottish Mathematical Council 2016 Conference
Stirling
Scottish Mathematical Council

Tuesday 29 March - Friday 1 April 2016
ATM Easter Conference - Mathematics as a Human Endeavour
Warwick
Association of Teachers of Mathematics

Friday 1 April - Sunday 3 April 2016
2016 MA Annual Conference
Oxford

The Mathematical Association

Tuesday 14 June 2016
The 3rd Annual STEMtech Conference & Showcase
Telford
STEMtech Education.

You can find previous *Building Bridges* features here.

Sixth Sense…sixth time lucky?

At the end of July, Ofqual joined the debate surrounding the mandatory GCSE resits in FE colleges for students who only achieve a D grade at the end of KS4. The TES covered the story.

What happens to students who do not get the Willy Wonka golden ticket of a GCSE C grade in maths? The Wolf Report (March 2011) stated that students should continue with GCSE maths and English if they did not achieve an A* to C grade. This was made a condition of a college's funding, so now every student with a D grade must resit GCSE. However, 40% of students do not achieve a C grade at Secondary School and 90% of these still do not achieve it by the age of 19. That's a shocking statistic, and a bleak prognosis for the students concerned.

This picture is from City College, Norwich, tweeted by the Deputy Principal Jerry White. It exemplifies the magnitude of the issue, and this is what's happening in a large FE college near you. 900 students sat a GCSE maths mock last February. There were another 200 back at college with extra time, readers etc. Calculators, rulers, protractors were all bought by the Deputy Principal.

So what are the main challenges? Students who do not achieve a C grade (after 11 years of learning maths) do not want to resit it: that's not why they came to college. They are disgruntled, and some can be "aggressively obstinate", as one tutor at Epping Forest College put it. Many don't attend the classes without a lot of coaxing and cajoling. But they deserve some sympathy: there is evidence of some students having sat the maths GCSE 10 times! They've sat every exam board in every sitting in Y10 and Y11; some schools were entering pupils in Y8 and 9 - at least Mr Gove put paid to that. Students who can't see the value - the necessity - of GCSE Maths at grade C or above are a challenge to teach, and there's now a lot more of them. So colleges need a lot more teachers, but …

… teacher recruitment is very hard nationally. FE is often not the first career choice of a newly qualified maths teacher - there should be research as to why this is the case - so vocational staff are stepping up to the plate, sometimes with little choice. But the budget for CPD is wafer-thin in most FE colleges (and there is no cover available), so these volunteers (or conscripts) are not getting the training and support they need. No doubt you are an excellent maths teacher, but could you start teaching Hair and Beauty or Plumbing next week with no training?

There has recently been some response to this from central government. The Education and Training Foundation (ETF) funded a range of CPD opportunities (including webinars - recordings of these are here, click the *GCSE Pipeline Webinars* dropdown, and the recordings are embedded in the text) for out-of-field maths teachers in FE colleges, and also strategies for improving recruitment of FE maths teachers - but these programmes are fixed term and short-lived. A recent study by ACER (Association of Colleges in the Eastern Region) on behalf of the ETF and the DfE culminated in a blog and a valuable free resource guide.

The Wolf Progress Report (February 2015) predicted that 16 600 more students would be re-sitting GCSE maths in June 2015. This number will increase further with the raising of the participation age to 18 from this coming September, far outstripping any likely increases of CPD provision and teacher recruitment. It's an enormous challenge. Let us know the ideas that you and your college are developing in response either by email to info@ncetm.org.uk, or @NCETMsecondary on Twitter.

You can find previous *Sixth Sense* features here.

Image credit

From the Classroom (Library's closed)

Holiday time often gives teachers a chance to think about their classroom's learning environment, and that got us thinking, as many of you no doubt are, about what would be a great maths classroom display for September. So we've taken the chance to magpie the very best ideas from others. Here is a selection of ideas to get you itching to find the giant stapler, the pinking shears, and those leopard print borders they have in Biology!

Suffolk Maths has a long listing of ideas for displays including the maths periodic table from various people, a Careers display from @El_Timbre, and maths bunting. This example of the Maths Periodic Table is from @DocendoTim (you can download a template for the periodic table from justmaths.co.uk):

There are lots of creative ideas for displays from Danielle Bartram, including maths bunting and some lovely vertical and horizontal number lines.

Mr Collins' blog New Role, New Classroom is well worth a read. He is a fan, as are many others including @Emrysmaths, of the mathematical Mr Men from solvemymaths.com which we featured in a previous issue. Here is his example of the jaunty little critters in their entirety…or are they? Which one is missing?

Paul Raymond Collins @mrpcollins · Aug 4
Just putting up @solvemymaths' Mr Men Display...it's awesome...however, I seem to have misplaced one, but which one?

What do you want your display to achieve? Is it to inspire your pupils, or to give them prompts and resources to reduce their dependence on you, or to cover the stain where the roof leaked over the summer? Once you've put up the displays, how will you use them? Would it be better to keep the walls blank for now and ask your pupils what they want to see there? Could they be put in charge of at least one wall? Send us some pictures and let us know what you decide to do, either by email to info@ncetm.org.uk, or @NCETMsecondary on Twitter.

You can find previous *From the Library* features here.

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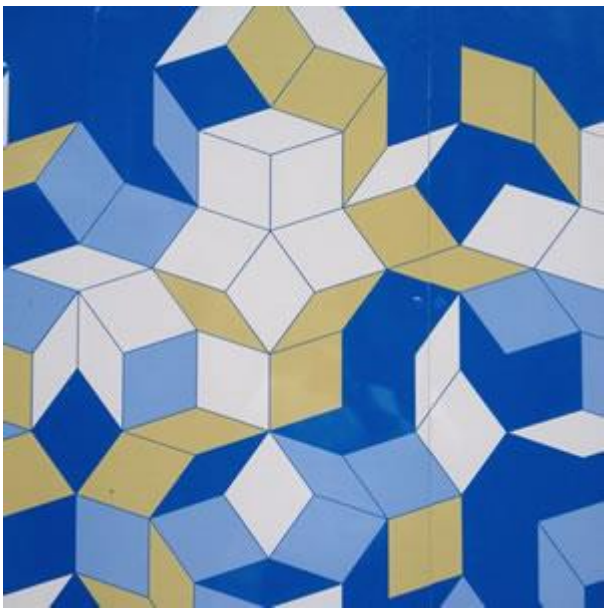
Eyes Down…

...quite literally - or up. There's lots of maths-prompting above and below us. Here is a picture from the Royal Academy Summer Exhibition and it wasn't even for sale, simply the grille on the radiator on the floor. What's the proportion that's metal and what's the proportion that's hole, I am wondering. What could pupils estimate from this image?

Here's a sight spotted from the huge queue at Stansted Airport. It's part of the roof. Many triangle questions come to mind!

Here's something tweeted by @NCETMsecondary in August, as he walked past a construction hoarding in central London, on which was printed a Penrose tiling design:



This month the American Mathematical Society includes a feature on Penrose tilings such as this, and their many symmetries despite being non-periodic. There's lots here to prompt rich class discussions with pupils of all ages – and some lovely wall art in case you haven't yet decided about your classroom displays!

If you have a thought-inducing picture, please send a copy (ideally, about 1-2Mb) to us at info@ncetm.org.uk, with a note of where and when it was taken, and any comments on it you may have.

Read previous *Eyes Down* features here

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