School of Education

The University of Nottingham

UNITED KINGDOM · CHINA · MALAYSIA

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Centre for Research in Mathematics Education

Newsletter No. 1

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Welcome!

Welcome to the inaugural newsletter from the Centre for Research in Mathematics Education (CRME) at the University of Nottingham. The Centre is involved in such a wide range of interesting and important work that we have decided to try and share some of this with teachers in the region as well as with our project collaborators and supporters. We hope you find it interesting and would welcome your feedback.

Malcolm Swan, Centre Director

CRME helps to advise the government

Hopefully you have heard of the Advisory Committee on Mathematics Education? It is a national committee of eight experts appointed from across the mathematics education community (plus an independent chair) and is based at the Royal Society in London. I joined the committee last year as ACME entered its second decade. The committee, supported by an 'outer circle' (of which Hugh Burkhardt is a member), plays a highly active role in advising the government on all matters related to mathematics education. That means that ACME is very busy due to the large number of changes that are currently taking place or being considered. In the last year ACME has completed a major piece of work on post-16 mathematics in response to Gove's desire that "within a decade the vast majority of pupils are studying maths right through to the age of 18". It has also produced a position paper on Able Mathematicians and been active in responding to consultations on A level reform, GCSE and the National Curriculum, amongst other things.

Over the coming weeks ACME will be encouraging people to respond to the Department for Education's National Curriculum consultation. It runs until the 16th April, which will give you something worthwhile to do during the Easter break! See the DfE consultation page for details.

You can sign up for the ACME newsletter here. ACME currently has an open call for new members.

Andy Noyes

Didactics in the PGCE

This year, the UoN PGCE course has made a particular point of focusing on where mathematical subject knowledge meets pedagogic knowledge - the area we are referring to as *didactics*. There have been a set of *didactics* sessions in which we have concentrated on one mathematical topic (e.g., negative numbers or proportional reasoning) and looked at the key ideas and how to teach them. Students from both Maths and Physics with Maths PGCE groups have been assisted in identifying the sequence of key concepts, special terminology, particular misconceptions and then suitable activities to use when teaching these. We have tried where possible to incorporate some aspect of international comparison – to analyse how the topic might be taught elsewhere. The sessions have been well received and will be further developed next year.

Mark Simmons

Visiting Scholar

My name is Dan Meyer. I'm usually located at Stanford University, where I'm a doctoral candidate in maths education, but currently I'm on a leave of absence that has allowed me to come learn from everyone in Nottingham. My current interest is mathematical modelling (what we often call "real world" maths) and how it's often distorted by print-based curricula. I'm working on a few digital curriculum projects – iPad textbooks and the like – and I'm optimistic about our digital future. If you'd like to know more about my work, please have a look at my blog or my TED.com talk, which I'll link below.

http://blog.mrmeyer.com/

http://bit.ly/meyerted

Dan Meyer

An experimental blog: the state of mathematics education in the UK

Since the beginning of 2011, at least 29 'official' reports related to mathematics (and STEM) education in the UK (and specifically England) were published. They range in scope from landscape reviews of mathematics education such as the so-called 'Vorderman Report' to quite specific reports such as the DfE evaluation of the Mathematics Linked Pair of GCSEs. Broadly, however, they appear to have the overarching aim of influencing policy.

Taken together, these reports contain some common messages about mathematics education in this country. For example, they usually include a section about what is wrong in mathematics education: for example, we aren't producing enough 'high flyers' and a high proportion of the population don't have sufficient mathematical knowledge and skills to live and work in the modern world. Some of them provide reasons for this state of affairs, such as the curriculum, the constraints of schools within a system which places accountability at its centre and so on. Many provide recommendations for ways forward, such as revised curricula and CPD for teachers.

I am interested in the 'big messages' coming from these reports and in the views of those directly involved with mathematics education. I am particularly interested in the views of people who teach (and learn) maths in schools, as these are the people who will be affected most by any new policies which might be influenced by the reports.

I have set up a blog and am inviting members of the wide mathematics education community (teachers, researchers, policy makers, pupils) to make comments on my emerging findings and on my research methods, which are innovate and experimental.

The blog is like a draft synthesis of the reports. It is intentionally unfinished, because I aim to incorporate the comments posted by visitors into the finished product. You might like to visit the blog, have a look at the various pages and post your own comments. I would be very pleased to receive your comments!

The blog can be found at mathsreports.wordpress.com.

Marie Joubert

Mathematics, visualisation and economic disadvantage

Anyone teaching mathematics knows how important diagrams can be in grasping mathematical concepts and solving mathematical problems. Yet diagrams are only one of the ways we come to "see" things. If we are going to keep learning new ideas and new structures in mathematics we have to be able to imagine objects that we can't actually see, but also need to be able to visualise all sorts of processes and objects and interpret visual information.

Yet interpreting diagrams and helping pupils visualise is rarely explicitly taught in school mathematics lessons and the result is that pupils see mathematics as written, largely formulas and equations that need to be textually manipulated.

For example in dealing with quadratic equations, how do you "*complete the square*"? Why do you even bother? What has it got to do with transforming the graph of $y=x^2$? What would the net of a dice look like? Where would the numbers go?

So we are interested in exploring the use of visualisation in teaching and learning mathematics and how we can support teachers and pupils to develop imagery and mental manipulation as a natural part of mathematics – which after all gets increasingly abstract the further you go.

There is another element to this. It is also well known that young people from challenging backgrounds find it harder to succeed at school mathematics than those young people who have experienced relative economic privilege. Schools don't make this any easier for them by placing all such pupils together in the same mathematics groups and restricting their curriculum and linguistic opportunities.

Research has consistently shown that young people from low socio-economic backgrounds specifically do less well on spatial tasks; something which is key to later success on mathematics. This may be due to their experiences as young children, the toys they have (or don't have!), the use they make of maps etc.

So we are pulling these two key issues in mathematics together and looking at the spatial and visual capabilities of pupils with low prior attainment, from low SES or less affluent backgrounds. We want to know what skills they have and don't have and also how their skills are used and developed in mathematic lessons. Finally of course we want to look at how we can support mathematics teachers to improve all pupils' metal imagery.

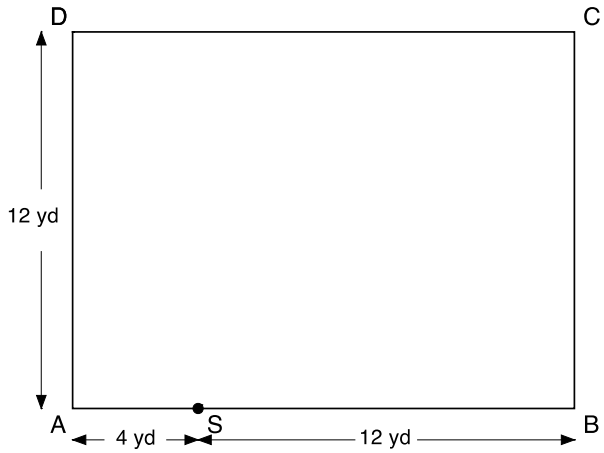
We probably can't do much about improving their social and economic backgrounds; we might however be able to do something about enhancing some of the key skills which they have not previously been required to focus on.

If you are interested in knowing more or being involved, contact me.

Peter Gates: peter.gates@nottingham.ac.uk

A task to try out

In each issue of the CRME newsletter we will attempt to include a mathematical task that we are currently developing. This one is being designed for use in the US (hence the use of yards and 'schoolyard') as part of the Mathematics Assessment Project. (There will be more about this in the next issue of the newsletter.)



Some children are playing a game in a rectangular schoolyard ABCD that is 16 yards by 12 yards.

The diagram shows the schoolyard viewed from above.

The children start at point S, which is 4 yards along the 16-yard wall AB. They have to run and touch each of the other three walls and then get back to S.
The first person to return to S is the winner.

What do you think is the shortest route for them to take?