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Centre for Research in Mathematics Education

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In this issue...

In this newsletter we have a report from Peter Gates on his recent trip to Australia, details about current research projects on multiplicative reasoning and A-level mathematics and news of our recent Ofsted inspection.

We hope you find the newsletters informative and would welcome your feedback and comments.

Colin Foster

Editor

University of Nottingham ITE Ofsted inspection

In November, our secondary Initial Teacher Education provision was inspected by Ofsted and we were delighted to be judged "outstanding" again. A key strength identified by the inspection team was "the shared vision and ethos, which permeates the partnership. This is characterised by very strong and active partnerships with schools".

The inspection team talked about the clear "legacy" of the training and how this feeds into our trainees' teaching long after their PGCE year; in exploring the partnership, they were impressed by the large number of teachers, many of whom are ex-trainees, and schools that are involved with the work of CRiME and recognised this as a "major strength and feature of the partnership".

Another important feature of the inspection report was "the very strong integration of theory and practice, informed by the most up-to-date and relevant research, enabling trainees to gain an in-depth understanding of the latest developments in education and in their subject

areas. This provides trainees with an exceptional introduction to the teaching profession and encourages them to use this understanding to enhance their teaching practice”.

The work of CRiME is again exemplified here, as our researchers work closely with our trainee teachers in a range of ways, from leading university-based sessions to running interest groups and building relationships with trainees that are then extended beyond the training year.

Stef Sullivan

PGCE Course Leader

Multiplicative Reasoning

The Centre is currently involved at both a design and a research level with a DfE-funded pilot being delivered through the NCETM. This one-year professional development project focuses on students’ learning of multiplicative reasoning and aims to see what can be learnt when bringing groups of teachers and university expertise together in partnership. The core purpose of the project is to improve the outcomes and experience for Key Stage 3 students in the area of multiplicative reasoning, leading to wider benefits for their mathematics education.

The project is arranged around three ‘Mathematics Education Strategic Hubs’ (MESH) based in Nottingham, Manchester and Portsmouth and involves 10 intervention schools and 10 control schools within each hub. The project is being delivered through a series of TIME (*Teachers Improving Mathematics Education*) team workshops, with two teachers from each of the intervention schools working together to deepen their understanding and develop their practice in the area of multiplicative reasoning. The teachers have access to new curriculum resources to use with their classes, designed to address the fundamental issues that pupils have with multiplicative reasoning content. These lesson units aim to expose misconceptions that might underpin superficially understood procedures and reveal and build upon students’ underlying conceptual understanding. They focus on making connections and deepening the understanding of the mathematics related to solving problems where the underlining structure is multiplicative. The lesson units have the following emphases:

- **Unit 0** – Formative Assessment task
- **Unit 1** – Reasoning and making sense of fractions

- **Unit 2** – Understanding and identifying proportional contexts
- **Unit 3** – Application to a range of proportional contexts

As teachers prepare to use the lessons in their classrooms they engage in a range of professional development activities: gathering and analysing evidence of impact, carrying out assessment interviews and completing a lesson-study style enquiry into a lesson from each unit. The process is supported by the TIME workshops and the effectiveness of this professional development model is being evaluated as part of the pilot. Schools' involvement with the project will run until the end of the pilot in July 2014. If the pilot proves successful, it will be replicated, in whole or in part, to allow more secondary schools to participate and benefit from a professional development programme designed to lead to better teaching and learning of multiplicative reasoning, resulting in better outcomes for students.

Clare Dawson

Visiting Scholar

Hi! My name is Laine Bradshaw. I am an Assistant Professor of Quantitative Methodology at the University of Georgia in Athens, USA. I am very excited to be visiting CRME for two months through a fellowship (www.ctl.uga.edu/faculty/sarahmossfellowship) I was awarded by UGA.

My research interests are in diagnostic assessment development and in the psychometric modeling of phenomena such as understanding and learning in educational domains. While I am here, I am interested in learning about how the formative assessment lessons (FALs, see <http://map.mathshell.org/materials/index.php>) were developed and am exploring the possibility of developing assessments aligned with the FALs that would yield statistical diagnoses of which common issues students have. This assessment context is well suited to a psychometric model I developed to diagnose misconceptions using information from which incorrect answers students select on multiple choice questions across an assessment. The overarching goal of my research is to contribute to the development of assessments that provide useful information to teachers and students for the purpose of supporting learning. More information about my research can be found on my website: <http://laineb.myweb.uga.edu/>.

Thank you for your interest in hosting me and collaborating with me!

Laine Bradshaw

Report from Australia

Between 1-15 February this year, I had the opportunity to visit colleagues in Queensland, Australia. I was able to visit several schools, including one in a new town called Varsity Lakes, which had 3000 pupils 4-19. Each (secondary) pupil had a laptop paid for by parents and purchased through the school. All textbooks and much of the class work was undertaken through the laptops, and the school was designed with lots of open spaces for breakout groups of pupils to explore mathematics. This was achieved after a lot of tension with the local authority, who can only design traditional spaces, it seems. The school was relaxed on mobile phone use, but did see the advantages of teachers being able to use them for improved communication. A far cry from the "ban them from the premises" of many UK schools.

One project we are developing is the use of iPads in mathematics teaching – currently looking into primary maths but we are now moving into secondary usage. The first stage of this project is an evaluation of existing apps (most of which are of dubious value, sadly!). Once we have completed that, we will look at working with teachers to see how some apps might be integrated into and around the secondary curriculum. An interesting question here is whether the improved communication and synchronisation of the iPad balances out the reduced functionality. One difficulty will of course be availability, as schools are unlikely to invest without clear advantages, and the possibilities won't be too widespread until greater investment. Thought on this would be welcome. Do you use iPads in school?

The advantages of a trip to Australia include temperatures in the upper 20s and 30s and long deserted golden beaches. The disadvantage is a 36-hour trip home.

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

Rethinking the Value of Advanced Level Mathematics (REVAMP)

The REVAMP project, funded by the Nuffield Foundation, started in the summer of 2013 and will run until late 2015. In October, Dr Mike Adkins joined the University as the researcher on the project, bringing with him a wealth of quantitative methods experience. The project, as the title suggests, explores the different kinds of value that are attributed to A-level mathematics. This is a hot topic at the moment as A-levels are being reformed, accountability measures are consulted upon and the government pushes ahead with its plan to have the vast majority of post-16 students studying mathematics by the end of the decade.

This project weaves together four strands of quantitative analysis to understand the current and changing attitudes to, participation in, and value (economic, educational, cultural, etc.) of A-level mathematics. The project

utilises high-quality secondary datasets (1958 NCDS, 1970 BCS, NPD & HESA) and will include a large-scale survey of 17-year-olds' understandings of the value of mathematics in their educational and life choices and aspirations.

The four quantitative strands of the project are

1. Updated research on the "economic return" to A-level mathematics;
2. An investigation of the nature of changing participation in A-level mathematics by Year 11 cohorts from 2003-10;
3. Modelling of the relationship between A-level mathematics and outcomes in a range of science and social science degree level programmes;
4. A large-scale survey of 17-year-olds.

These quantitative studies will be interwoven with analysis of the recent development of some of the key policy ideas that are influencing current thinking about A-level mathematics, in particular its economic value. The project will produce a thorough and timely account of the state of attitudes to, and participation in, advanced mathematics.

Andy Noyes

CRiME seminar programme

Our seminars since September have been:

- Education of rural and remote children: The InSPIRE project in Sabah – Shafia Abdul-Rahman, Visiting Scholar
- A teacher's role in mathematics teacher professional development: how can university colleagues collaborate? – Barbara Jaworski, Loughborough University
- Post-16 mathematics: learning from policy overseas – Jeremy Hodgen, King's College, London
- Beyond basic skills: Embedding numeracy across the curriculum – Merylyn Goos, The University of Queensland and Loughborough University
- The African Institute of Mathematical Sciences (AIMS): professional development for teachers of mathematics – Claire Blackman and Barrie Barnard, AIMS

- Providing assessment feedback via multiple model-based diagnoses – Laine Bradshaw, University of Georgia, Visiting Scholar

Other seminars planned for later this year include:

- Peter Gates – Now you see it, now you don't (date TBC)
- Candia Morgan – The evolution of school mathematics discourse (ESMD) project (30th April)
- Jill Adler – Mathematics teacher professional development in schools for the poor: Insights from a five-year research and development project in South Africa (4th June)

We usually do some sort of social event after a seminar, such as a meal out or wine and nibbles in the department. Everyone is welcome to attend both the seminar and the social event: if you are not receiving notifications of the events, and would like to, please get in touch with Mat Crosier Mathew.Crosier@nottingham.ac.uk.

Marie Joubert

New Head of School

We are very pleased to announce that the University Executive Board has appointed Professor Andy Noyes to be Head of School for a four-year period from 1 August 2014. Well done Andy!

If you have any comments regarding this newsletter, or would like to be added to or removed from our mailing list, please contact mathew.crosier@nottingham.ac.uk. Previous newsletters can be found at www.nottingham.ac.uk/education/research/crme/crme-news.aspx. The editor is Colin Foster.