Autumn 14

NRICH annual report 2013-2014

Lynne McClure

NRICH Annual Report for the year ending 31-8-14

NRICH aims to:

- Enrich the experience of the mathematics curriculum for all learners
- Offer challenging and engaging activities
- Develop mathematical thinking and problem-solving skills
- Show rich mathematics in meaningful contexts
- Work in partnership with teachers, schools and other educational settings

The NRICH team

Lynne McClure	Project Director
Liz Woodham (PT)	Primary Coordinator
Jennie Pennant (PT)	Primary PD Lead
Bernard Bagnall (PT)	Primary Teacher Associate
Charlie Gilderdale	Secondary Coordinator
Alison Kiddle	Secondary Teacher Associate
Steve Hewson (PT)	Post 16 Coordinator
Emma McCaughan (PT)	AskNRICH Teacher Associate
Rob Percival (PT)	Stimulus Coordinator
Fran Watson	NRICH Roadshow Schools Liaison Officer

Technical support:

Mike Pearson
Owen Smith
Technical staff are employed by the MMP and have duties across all the projects.

People

There has been little personnel change this year. We said goodbye to Sue Hickman-Pinder and welcomed Fran Watson into her role in charge of the Roadshow. Emma McCaughan completed 15 years as coordinator of AskNRICH. Alison Kiddle took on increased responsibility for the KS5 section of the site when it was clear that because of ill health Steve would not be returning in the short term. We miss him and wish him well.

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Our Funders

As reported last year, we are currently fully funded, through a combination of grants and income generated, but only for the next 18 months. Citi Foundation's funding for STEP Prep has now finished but supported some of the KS5 work this year. A major grant from the Templeton World Charity Foundation, to support a project developing resources to encourage the development of mathematical creativity, began in September 2013 and funds Charlie, Alison, Liz and Bernard and some of Fran and Lynne. This grant, together with the contribution from the Cambridge Maths Education Project (CMEP), and the generous funding from Cambridge Assessment (CA) and Cambridge University Press (CUP) has covered the Director's salary. The remaining fraction of Fran's post and all of Jennie's post costs are covered by income we generate from our work with schools. However the funding cycle is such that we are already beginning to look for funding for 18 months time, working with the University's Development Office.

Other significant income generation

Charlie continues his consultancy to the Heymath project, based in India and very active in Singapore and a number of other countries, and has travelled abroad for Cambridge International Examinations (CIE) to promote Learner-Centred Mathematics Education.

Liz and Michael Hall, an independent consultant, successfully bid to the London Schools' Excellence Fund for a project with fifteen Haringey primary schools. Over five terms and ten face-to-face sessions the project aims to improve primary teachers' Maths subject knowledge and pedagogic knowledge, thereby increasing pupil attainment. Jennie coordinates an on-going series of seminars, held at the London Mathematical Society (LMS), and designed to support primary Maths Specialist Teachers (MaST). These have proved extremely popular and we now have a database of over 450 MaST colleagues with whom we regularly communicate.

Bernard and Jennie together have developed a fruitful relationship with Explore Learning, a private company that runs after school clubs. As well as designing rich

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tasks suitable for their national team challenge, Jennie and Bernard have worked with the coordinators to support them in understanding what rich tasks are and how best to communicate them to their students. Liz and Bernard were also contracted to work with the maths team at CUP in linking their new international primary mathematics scheme, 'Cambridge Primary Mathematics', to activities on the NRICH site, and to write new tasks to supplement these. Our income is as usual supplemented by conference keynote fees, other CPD events with teachers, workshops for students, and advisory fees and royalties from publications.

The Website

The redesigned website is now well established and we have had positive feedback from our users. Most of the work in recent months has focussed on the Templeton Developing Mathematical Creativity project. The first primary creativity strands look at strategy games, cutting and folding paper and exploring different environments, whilst those for older students explore mathematics on dotty grids, and freedom and constraints. This project has allowed the team to work more closely together, and with the editors of the PLUS site, http://plus.maths.org/ in developing materials.

Alison has also been working on the STEP Prep features http://nrich.maths.org/step and there are now 24 modules which this year's STEP students will be able to work through independently.

To cater for the other end of the age range Liz and Bernard have added to the Early Years collection of tasks http://nrich.maths.org/early-years - these have been particularly well received by teachers.

CPD content

The new curriculum has been at the forefront of most teachers' minds this year so we have endeavoured to support them by offering new CPD packages and articles, many on the three curriculum aims of fluency, reasoning and problem solving. Our primary Curriculum Mapping Documents have been updated for the new curriculum, and the primary team has written many CPD articles which link with the MaST seminars to produce a coherent package for teachers.

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The secondary team has continued to add to the Curriculum Mapping Document and the Stage 3 and 4 and Stage 5 Curriculum pages on the site. They have begun to work closely with Don Steward to adapt some of his resources for NRICH, and these will be appearing on the Mapping Document in the next few months.

Features by age and title

	For teachers	For students
Early years	Shapes in the Bag, Mud Kitchen, Cooking, Scooters Bikes and Trikes, Balances, Number Book and a new articles section	
Primary **Features**	Problem Solving (has been updated and republished this autumn) Counters (including article on manipulatives generally) Fractions Geoboards Number Sense and Place Value Number Fluency Cubes Algebra in the New Curriculum Reasoning	**For Lower Primary Students:** Counters Fractions Geoboards Number Sense and Place Value Number Facts Thinking Differently Cubes Reasoning For Two
		For Upper Primary Students: Counters Fractions Geoboards Number Sense and Place Value Approaching Midnight Number Facts What's Algebra All About? Cubes Reasoning For Two

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Secondary Features	Place Value and Powers Statistical Investigations Dotty Grids - an Opportunity for Classroom Exploration Freedom and Constraints in the Classroom	**For Lower Secondary Students:** How Numbers Behave Let's Use Statistics Freedom and Constraints Dotty Grids – Drawing Polygons Dotty Grids – Exploring Area Dotty Grids – Exploring Coordinates and Vectors Dotty Grids – Exploring Distance
		For Upper Secondary Students: Plotting Graphs Exploring Dotty Grids at Upper Secondary Making Sense of Data How Powers Behave

Metrics

We now have over 10,000 tasks, articles and games on the site, for all ages, stages and capabilities. The statistics indicate that the number of visits to the site continues to increase, and has in fact risen by 1.7 million/38% compared with this time last year. Our numbers for unique visitors for the year are up by 41% to 3.5 million. Over the same period of time we have seen a 37% increase in visits from UK users to 3.2 million.

	Visits 2012/13	Visits 2013/14
Sep	388,682	564,058
Oct	430,916	610,143
Nov	395,190	611,052
Dec	257,995	416,352
Jan	409,336	599,070
Feb	404,297	559,467
Mar	437,981	683,333
Apr	393,058	458,968
May	448,695	578,773
Jun	455,008	577,479
Jul	222,251	365,035
Aug	170,233	300,030

Our teacher registrations to the site (NRICHSUPPORT for teachers and parents) now stand at 15,238, an increase of

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2,500/19% this year. NRICHTALK (for pupils) has 1,902 subscribers, a small increase of 114/6%. We also have new specific lists for MAST teachers (356) and MAST tutors (72). All subscribers receive a monthly update from NRICH.

	2013	2014
Visits/sessions	4,567,812	6,323,720
Users/Visitors	2,524,781	3,574,917
UK visits	2,335,440	3,216,219

Future site plans

The Templeton project requires a different presentation on the site and we have spent considerable time and effort this year thinking about how this would work best. Thanks to a lot of innovative thinking by Mike, we think we have a solution now and hope to make this new part of the site public by the end of the year.

Development projects

The Cambridge Mathematics Education Project http://www.maths.cam.ac.uk/cmep/ was set up as a joint project between the Mathematics Faculty and NRICH. Although NRICH and CMEP are separate in fact there is a lot of overlap, especially obviously at KS5. The rate of writing tasks for publication on the CMEP site has increased rapidly now that the planning phase is over, and the site is already available to our partner and affiliate schools. Again we hope that the site will go public in the next six months. The CMEP team, supported by the NRICH team, has also delivered three CMEP residential workshops to over 100 A level teachers this year.

Professional Development Activities

We enjoy working with teachers in a variety of settings. This year we have begun to rationalise our activities and have focussed on: 'advertising' – keynotes or other events where we know we will not change attitudes but will acquaint teachers with the full range of activities on our site; working with multipliers – consultants and co-ordinators whom we know will be able to share what we have developed with their colleagues; and longer term projects – working in depth with one school or group of schools in order to bring about sustained change.

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Over the year we have worked with approximately 6000 teachers, 500 of them here at CMS and the remainder at various venues around the country or abroad. This year, in order to support primary teachers in implementing the new curriculum, NRICH, together with NCETM, NAMA, MA and ATM, organised nine two-day workshops countrywide, working in total with over a thousand teachers.

Please see Appendix A for examples of PD activities

Teacher Inspiration days

In July at CMS we hosted nearly a hundred Newly Qualified Teachers from primary and secondary schools at our Teacher Inspiration Day. This is the fourth year we have offered this free CPD day and it is always well received. Professor Mike Askew gave a keynote entitled 'Structure & Freedom: Preparing for the unexpected in mathematics lessons' which appealed to all delegates at whatever stage they teach.

Also in July we invited primary and secondary practising teachers to join us in evaluating the first few tasks we had designed for the Templeton creativity project. This triangulation by teachers is an important part of our work.

Future CPD plans

NRICH was delighted to be invited to be one of only four strategic partners for the newly created maths hubs across the country. These maths hubs are the government's initiative to ensure relevant and high-quality professional development for all teachers of mathematics. Lynne presented at the launch event in June and since then we have been contacted by a number of hubs with a view to supporting their CPD programmes. We are closely associated with the Cambridge Hub at Comberton, headed up by Rachel Horsman.

Working with students

This year we have worked with approximately 2000 students, in addition to those Fran has worked with as Roadshow participants. In connection with the STEP prep part of the site, Alison ran the STEP Prep summer school for 40 students from 5th to 8th August, a residential school organised in conjunction with the admissions office.

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The school offered a challenging academic programme and gave highly achieving students from less advantaged backgrounds an opportunity to experience life in Cambridge and learn more about STEP.

Education and CMS

The team continues to be involved with the Faculty of Education, attending meetings of the STEM academic group. Steve is the latest to complete his M.Ed and Lynne is editing a secondary book with Faculty of Education colleagues. We also contribute to both Secondary and Primary PGCE courses by presenting sessions about NRICH to the trainees.

Wider representation and professional activity

It is a sign of the increasingly wide reach of NRICH that we are invited to join various national groups and advisory bodies. Jennie is now a member of ACME whilst Lynne retains her membership of the ACME Outer Circle. NRICH was invited to become a participating society of JMC, which in itself is an acknowledgement of a high profile in the Mathematics Education community. In addition team members sit on the DfE Expert Maths group, advisory boards for OCR, MEI, Critical Maths, Maths Mastery and the PRIMAS and MASCIL European projects. We continue to work in professional partnership with UKMT, NCETM and several different subject associations.

In September 2014 NRICH was delighted to host the tenth annual conference of the International Society for Design and Development in Education (ISDDE, http://www.isdde.org/isdde/index.htm) Over 70 international delegates met over four days to explore design in curriculum, assessment, resources and professional development in maths and science education. This conference places NRICH firmly on the world stage.

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Research

One of the benefits of NRICH becoming increasingly well-known and regarded is that respected experts in the field of mathematics education are happy to work with us. For the Early Years section of the site we have worked with Dr Sue Gifford who has helped us to provide short accessible articles about supporting evidence; Professor Anne Watson worked with us on a feature about progression in algebra in the new National Curriculum and Dr Jenni Back informed our work on manipulatives. Our MaST days have been heavily informed by our own reading of the literature and research into mathematical fluency and reasoning.
The Templeton grant has provided an opportunity for us to delve into and synthesise the literature on mathematical creativity and on-line models to support students working independently.

AskNRICH

AskNRICH began at the same time as the main NRICH site and over the years has supported hundreds of students in their individual endeavour to understand mathematics. However the site now looks very dated and, possibly because of the prevalence of many other social media sites, was being used by fewer and fewer students. We therefore decided that, rather than let it slowly fade, we would make the decision to close AskNRICH and consider whether a more up to date and attractive format could be developed. This is not a high priority at the moment but we will return to it once the Templeton project is well developed.

STIMULUS

Last year was the most successful year yet for the STIMULUS project. 291 students were placed in 41 local schools in a variety of supportive roles, from working with struggling learners to challenging those who needed it. Students worked in classrooms of all ages – from 5 to 18 year olds - and in several different subjects including maths, sciences of various kinds, and technology. In the summer of 2014, Rob started looking into the possibility of STIMULUS volunteers running Code Clubs. Code Club is a national organisation through which volunteers go into primary

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schools to run coding clubs with Year 5 and 6 students. After a small marketing campaign, 30 volunteers were placed at 10 primary schools in the Cambridge area. They received training from Rob in May, and will be going into schools from October 2014. Code Clubs are hugely beneficial (and always highly enjoyed) by primary pupils, and it gives volunteers who want to lead sessions (rather than support teachers) with groups of children an opportunity to do so.

Thanks are due to Owen for rebranding the STIMULUS website to fit with the new University web template and the look of the main MMP website. A newly added 'student stories' page, is at stimulus.maths.org/content/student-stories.

Mathematicians in Residence

This year was the third that MiR ran in local sixth forms. Four Part 3 students spent two weeks supporting A level teaching. Although the numbers are low, the reception has been overwhelmingly positive.

Roadshow

Fran Watson was appointed to the role of Schools Liaison Officer on the retirement of Sue Hickman-Pinder. Together with a change in funding, this provided us with the opportunity to make even closer links between the Roadshow and the rest of the project, so Fran has been able to take an active part in the Templeton work and pursue her own interest in Origami as well as take the Roadshow far and wide, including to Singapore and South Korea. We are currently developing the accompanying CPD package for schools to support them to develop the Roadshow/NRICH approach in their classrooms.

Publications

Pennant, J and Woodham L (2014) *Understanding Fractions* in Primary Mathematics Vol 18 Issue 2 Leicester: Mathematical Association

Woodham L (2013) *Primary children's mathematical recording* in Primary Mathematics Vol 17 Issue 3 Leicester: Mathematical Association

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McClure L (2014) *Reasoning* in Primary Mathematics Vol 18 Issue 4 Leicester: Mathematical Association

McClure L (2014) *Low threshold high ceiling* Teach Primary May 2014

McClure L (2014) *Should Maths be Fun?* Teach Primary October 2013

Marketing and Publicity

We now have over 5000 Facebook followers and 14500 Twitter followers. Twitter has become a useful way to communicate with our users on a more regular basis than our monthly newsletters allow, as we can tweet about new resources or professional development work and get instant feedback.

Into the future

The NRICH project is widely known and respected. Through our 'low threshold high ceiling' activities we offer support and challenge on topics both within and outside the usual mathematics curriculum, together with extensive teacher support material. There are already over 10,000 tasks on the site for students from 3 to 18+ and catering for nearly all students, the exception being those at the very lower end of the attainment spectrum who find mathematics very challenging. Our task in the future then is to rework and re-package the content of our site so that it is seen as the essential source of high quality resources for teachers who understand the importance of mathematical thinking in the classroom, and to work face to face with those who aren't yet convinced! In order to do this outreach work effectively we will have to enlarge the team and that of course is dependent on securing advance funding.

This is my last report as Director of NRICH as I shall be moving on in November. I have found the role hugely challenging and enabling and I wish the new appointee, whoever that might be, the same enjoyment and fulfilment.

Lynne McClure

NRICH Project Director September 2014

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Appendix A NRICH out and about

PRIMARY

Sustained programmes: EXPLORE – ongoing CPD for local organisers; MaST Leading Learning days – Haringey two-year project – St Neots three-session programme together with University of `Northampton and LEA – New National Curriculum national training events with NAMA, NCETM, MA and ATM - Borehamwood six-session programme - Camden six-session programme with Eleanor Palmer teaching school

INSET: Dulwich Prep London, Lanesborough Prep Guildford, Croydon LA (first three years of teaching), Riddlesdown school, Croydon (NQT event), NQT day at CMS; Singapore Conference at Tanglin Trust School

Keynotes: LA conference Shropshire, Portsmouth teaching schools alliance, Hants LA (New Forest section), Surrey LA conference, Balcarras teaching school alliance, Princes Trust, PGCE Warwick University, Bristol LA conference.

Workshops: BCME 8, MA CPD event (High Wycombe).

SECONDARY

INSET: Plymouth Learning Trust Maths Teacher INSET day; PRIMAS day at the Royal Society; Prince's Teaching Institute; Newquay (Cornwall Maths Conference); BCME8; CIE – Vietnam, China, Malaysia; UKMT Edinburgh, Leicester, Greenwich, Brighton; Singapore Conference at Tanglin Trust School; Dublin – Enrichment session for National University of Ireland Masters in Mathematics and Education; London FMSP E&E days and Conference; NAMA Conference (Alison's thesis dissemination)

Student workshops: Be a Mathematician for an hour – Cambridge Alumni festival; Dublin – Maths Week Ireland

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