



## NRICH annual report 12-13

Lynne McClure

# NRICH Annual Report

For the year ending 31-8-13

## The NRICH team

Lynne McClure	Project Director
Liz Woodham (PT)	Primary Coordinator
Jennie Pennant (PT)	Primary Coordinator
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

## Technical support:

Mike Pearson

Owen Smith

Technical staff are employed by the MMP and have duties across all the projects.

## Consultants

Jenny Murray	Primary
Sue Gifford	Early years
Penny Coltman	Early years
Cherri Moseley	Early years
Tony Beauchamp	Proofreader

## People

There have been a few small changes to the team this year. We said goodbye to Dr Jenny Gage who retired at Easter time, to Dr Jenni Back who returned to the NCETM after a year of covering part of Liz's maternity leave, to Jenny Murray who retired from her valuable work supporting the primary team and to Tony Beauchamp who retired as proof reader after many years of support. To all of them we owe our thanks. We welcomed Liz back, now joined by Jennie Pennant who continues her maternity cover role to partner Liz as primary coordinator. Bernard continues his part-time role to complete the primary team. Charlie continues to coordinate the KS3 and KS4 site content in partnership with Alison, who has taken increasing responsibility

for the KS5 site as Steve's role has evolved this year. Emma McCaughan and Rob Percival remain as AskNRICH and STIMULUS coordinators respectively.

## Our Funders

2012/13 was a challenging year financially. Our day-to-day support is provided by the Centre for Mathematical Sciences but we look to external funders for our salaries. At the beginning of the year we secured funding from the DfE for our part in the CMEP project (see later), from Citibank for KS5 STEP activity, and were funded for the last year of our Clothworkers' activity for KS3/4 STEM. As for the previous three years, The Royal Society funded 10% of the Director post to cover time spent on ACME business. However the total of this funding this still meant a large shortfall which meant we had to dip extensively into our reserves to cover the outstanding salary costs.

The future however is rosier; in recognition of the closer working relationship between them and NRICH, CUP and Cambridge Assessment have jointly and generously agreed to underwrite half of the Director's salary for the next three years. Together with a large, three year, Templeton World Charity Foundation grant awarded to start in September 2013, all but a very small amount of salary costs is now secure.

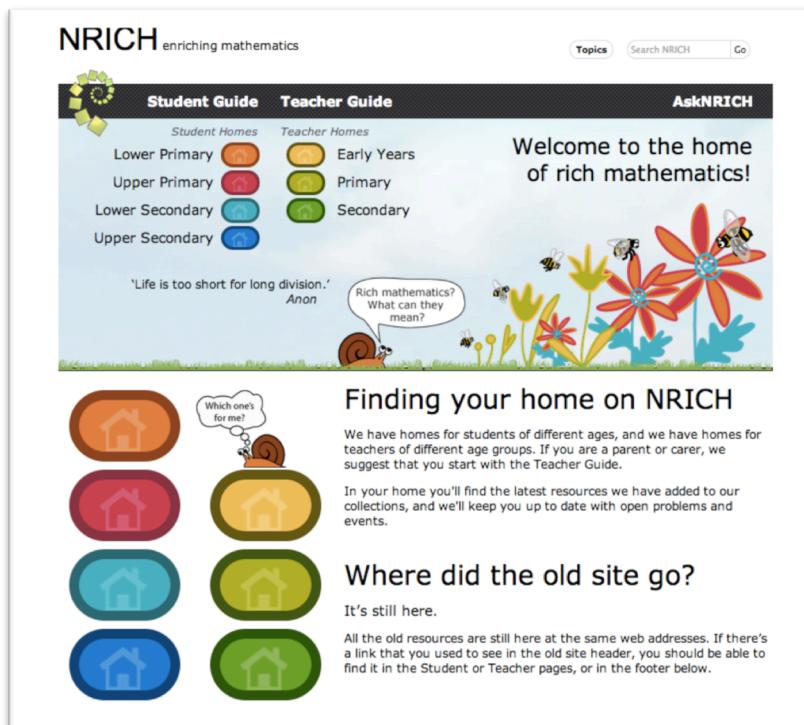
### Other income generation

As in previous years, we undertake other medium-sized projects which supplement our income. 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 extensively this year for CIE to promote Learner-Centred Mathematics Education. The primary team is mapping NRICH resources onto the Cambridge Primary Maths books for CUP, and the Director has worked extensively during the year on redrafting the mathematics National Curriculum and GCSE subject criteria for the DfE.

Other smaller amounts of income are derived from conference keynotes, CPD events with teachers, workshops for students, and royalties from previously published books and resources.

## The Website

By far the biggest event of 2012 was the launch of our redesigned and restructured website. This was a long project which took us over a year, during which we continually refined our ideas about the functionality and look of it. The structure now offers seven different 'homes' so that teachers and students in different



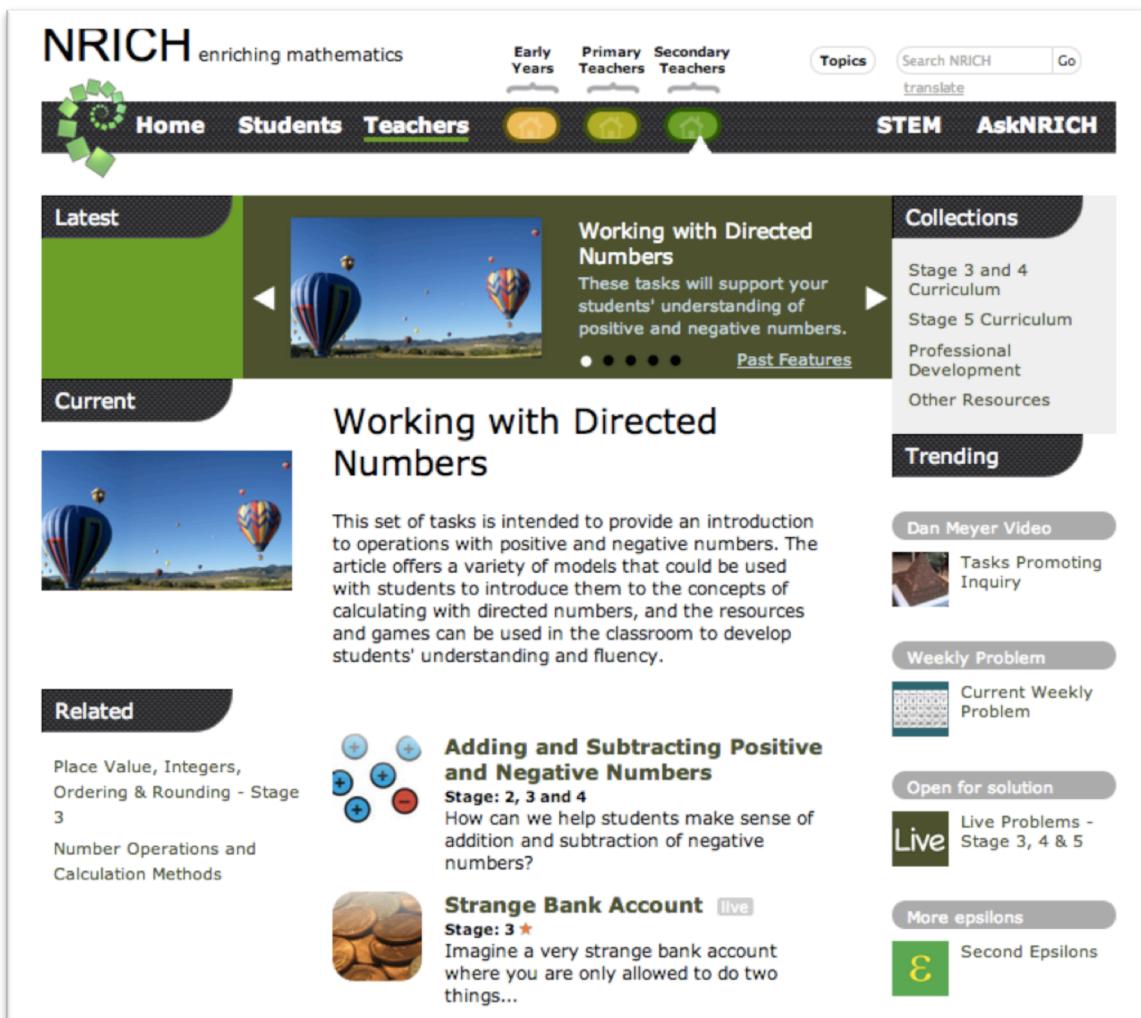
The screenshot shows the NRICH homepage with a new navigation structure. At the top, there are links for 'Topics', 'Search NRICH', and 'Go'. Below this is a 'Student Guide' and 'Teacher Guide' section with icons for 'Student Homes' (Lower Primary, Upper Primary, Lower Secondary, Upper Secondary) and 'Teacher Homes' (Early Years, Primary, Secondary). A 'AskNRICH' button is also present. The main content area features a welcome message: 'Welcome to the home of rich mathematics!' with a cartoon illustration of a snail, bees, and flowers. A quote from 'Anon' is displayed: 'Life is too short for long division.' A speech bubble from a snail asks, 'Rich mathematics? What can they mean?'. Below this, a section titled 'Finding your home on NRICH' shows a grid of colored house icons (orange, red, blue, green) arranged in two columns of four. A snail is shown thinking, 'Which one's for me?'. Another section, 'Where did the old site go?', states, 'It's still here.' and provides a note: 'All the old resources are still here at the same web addresses. If there's a link that you used to see in the old site header, you should be able to find it in the Student or Teacher pages, or in the footer below.'

phases have different views of the site. Remarkably our site visits did not reduce during the period of switching over from old to new site – this is unusual and we hope reflects the fact that users appreciate the much clearer navigation, which makes the content more accessible.

Tasks, articles and games are now gathered into themed 'collections'. These are featured in rotation on the appropriate home page so that our very best content is drawn to users' attention. Each home page also links permanently to the collection repository and other resources such as curriculum mappings and professional development materials, and the search facility allows users to find tasks by title, content theme and key stage.

A new feature is our 'trending' section. Here we display items or news that we change frequently, including student solutions to the recently 'live' problems and the publication of weekly problems taken with permission from the United Kingdom Mathematics Trust (UKMT) extensive bank.

As well as revamping some of our favourite tasks (see table on page 6) to make them suitable for our collections, we have also designed new content. The Early



The screenshot shows the NRICH website interface. At the top, there is a navigation bar with links for 'Home', 'Students', 'Teachers' (which is the active tab), 'Early Years', 'Primary Teachers', 'Secondary Teachers', 'Topics', 'Search NRICH', 'translate', 'STEM', and 'AskNRICH'. Below the navigation bar, there are sections for 'Latest' (a green box with a green circular icon) and 'Current' (a box with a blue circular icon). A central feature is the 'Working with Directed Numbers' task, which includes a thumbnail image of hot air balloons and a brief description: 'These tasks will support your students' understanding of positive and negative numbers.' Below this, there is a 'Collections' sidebar with links to 'Stage 3 and 4 Curriculum', 'Stage 5 Curriculum', 'Professional Development', and 'Other Resources'. On the right, there is a 'Trending' sidebar with links to 'Dan Meyer Video' (with a video thumbnail), 'Weekly Problem' (with a grid thumbnail), 'Open for solution' (with a 'Live' button), and 'More epsilons' (with an 'E' icon). The main content area also features a 'Related' section with links to 'Place Value, Integers, Ordering & Rounding - Stage 3' and 'Number Operations and Calculation Methods'. There are also thumbnail images for other tasks like 'Adding and Subtracting Positive and Negative Numbers' (with a plus and minus icon) and 'Strange Bank Account' (with a coin icon).

Years collection <http://nrich.maths.org/early-years> which was begun two years ago is now a significant body of work and we add a new resource to it each half term. The STEM section of the site <http://nrich.maths.org/stemnrich> has also been redesigned and added to and is now a complete extensive set of tasks for KS3 and 4, complementing the existing collection of KS5 STEM resources. Jenny Gage directed this project and the associated STEM Teacher Inspiration days. One of the keynote speakers at day 3 was Alf Coles who devised tasks for the site on the theme of Planet Earth (<http://nrich.maths.org/planet>) to link with 2013 being the Maths of Planet Earth Year. Jenny also worked with Professor David Speigelhalter on a Winton-funded probability project. This resulted in a set of resources aimed at KS 3

and 4 entitled 'Great Expectations' and was launched publicly to an enthusiastic audience in May <http://nrich.maths.org/probability>.

Funding from the Citi Foundation has enabled Alison to put together a series of online 'STEPPREP' modules <https://nrich.maths.org/step> to complement the Citi-funded STEP school she ran during the summer of 2013 for Y12 potential Cambridge applicants. The first of these modules are online already and they will be added to each fortnight throughout the year.

In partnership with colleagues in the Education Faculty, we marked the retirement of one of the founders of NRICH, Libby Jared, with a feature edited by the PGCE secondary class of 2013 and dedicated to Libby. It took her very much by surprise! <http://nrich.maths.org/10008>.

Primary Features	Secondary Features
Playing with Number	Working with directed numbers
Playing with 2D Shape	Great expectations
Playing with Dice	Introducing complex numbers
Low threshold high ceiling tasks	Working with metal images
Recording mathematics	From area into integration
Working systematically	Teaching to reason with numbers
Developing able young mathematicians	Teaching geometrical reasoning
Developing group working skills	Data and statistics
Number patterns	Patterns in number sequences
Strategy games	Developing systematic approaches

## Secondary collections

A collection of "rich tasks" and resources linked to the secondary school curriculum: <http://nrich.maths.org/8517>

A collection of activities designed to develop students' capacity to work as mathematicians: <http://nrich.maths.org/8767>

A collection of articles for secondary teachers on rich mathematical tasks: <http://nrich.maths.org/9098>

A collection of articles for teachers on mathematical pedagogy: <http://nrich.maths.org/7378>

## Metrics

We now have over 10,000 tasks, articles and games on the site, for all ages, stages and capabilities. The statistics to the right indicate that the number of visits to the site continues to increase, and has in fact risen by 22% compared with this time last year. Our numbers for unique visitors for the year are up by 17% to 2.7 million. Over the same period of time we have seen a 25% increase in visits from UK users to 2.5 million

	Visits 2011/12	Visits 2012/13
Sep	324,752	388,682
Oct	349,638	430,916
Nov	374,269	395,190
Dec	235,446	257,995
Jan	340,627	409,336
Feb	349,865	404,297
Mar	374,726	437,981
Apr	281,238	393,058
May	380,529	448,695
Jun	301,074	455,008
Jul	222,251	312,512
Aug	170,233	194,155*

Our teacher registrations to the site

(NRICH SUPPORT for teachers and parents) now stand at 12,752, an increase of a massive 32% this year. NRICH TALK (for pupils) has 1788 subscribers, a small increase of 2%. We also have new specific lists for MAST teachers (264) and MAST tutors (59). Subscribers receive a monthly update from NRICH.

## Future site plans

The new Templeton creativity project will inform the majority of our work in 2013/14 and beyond. We also expect that ideas generated in CMEP (see below) will impact on our thinking, for example in the way tasks are linked and the redesign of interactivities to be appropriate for all platforms. A new UK maths curriculum will necessitate revisions to our curriculum mapping documents and we are already thinking about different ways of presenting these.

## Development projects

The Cambridge Mathematics Education Project <http://www.maths.cam.ac.uk/cmep/> is a joint venture between the University Faculty of Mathematics and NRICH. It began in autumn 2012 with funding from the UK Department for Education. The project will have a website, on which there will be freely available resources for teachers and students, with the aim of making sixth-form (16-18) mathematics a rich, coherent and stimulating experience for students and teachers. The project is aimed at the whole spectrum of students currently taking A-level Maths (and Further Maths). Steve, Alison, Mike and Lynne are partially or wholly funded to work on the project together with academic mathematicians.

## Professional Development Activities

Over the year we have worked with approximately 5800 teachers, nearly 1000 of them here at CMS and the remainder at various venues around the country. The patterns of CPD at primary and secondary level have changed this year. Most secondary team CPD has been single visits to schools, usually working with whole departments, apart from the work abroad where workshops have been offered to teachers from many different schools.

At primary level, the team re-planned the CPD strategy to make best use of the limited resource of the small team. CPD invites were accepted if they met one of three criteria:

- advertising the project (keynotes, ITT sessions); the team delivered over 30 keynotes during the year.

- working with 'multipliers' (MaST teachers, subject leaders, heads); the MaST programme, led by Jennie Pennant, has been particularly successful in bringing together specialist teachers in primary schools to meet termly. Such is the popularity that each day is run twice to cater for the number of interested delegates.
- longer action research projects involving multiple visits: for example the team worked with Wroxham teaching school alliance to deliver a year-long programme to partner schools.

### **Teacher Inspiration days**

Over the last five years we have developed Teacher Inspiration days, held at CMS, each with a different focus. Last year we delivered three linked days with a STEM focus, when the team worked in partnership with practising teachers to deliver a varied programme linking science, maths and technology. We also worked in partnership with the PRIMAS team at Nottingham University to deliver three linked days focusing on inquiry based learning, and a single day for NQTs.

### **Future CPD plans**

We will continue with our TI days next year, in particular the NQT day as this has proved very popular. We have funding for dissemination conferences linked to the Templeton creativity project and we are actively seeking funding for workshops for parents of primary children.

### **Working with students**

This year we have worked with approximately 1270 students. The secondary team have designed and presented the maths content for a Sutton Trust school for those who might be interested in studying maths at Cambridge and two residential schools for students intending to take STEP papers. One of these was the Citi STEPPREP mentioned earlier in this report. The team, together with other CMEP colleagues, worked for a day with year 12 students from CMEP partner schools. We have also presented in-school workshops in various venues and supported the family 'Maths Circle' events at CMS on Saturdays throughout the year.

## Education and CMS

As well as partnering Mathematics faculty colleagues in CMEP and contributing to faculty summer schools, members contribute to primary and secondary PGCE courses in Maths and Science at the Faculty of Education. We attend STEM academic meetings and Maths colloquia whenever possible. Alison successfully graduated with her MEd, (A case study analysis of the professional efficacy of a Twitter-based mathematics teacher network) and Steve has submitted his thesis (A conceptual framework for understanding mathematical creativity). Having two additional colleagues regularly visiting the Education Faculty has helped to raise the profile of the project there.

## Wider representation and professional activity

NRICH was delighted to be invited to join JMC this year. We see this as an indication that the project is nationally respected. All team members are active in various subject associations, with several holding a post of responsibility.

Team members represent the project on various local, national and international advisory boards, for example the OCR maths council, MEI's Critical Maths project, the Maths Mastery steering group, and PRIMAS and MASCIL (pan-European PBL projects).

We work with, or have positive relationships with many mathematics organisations such as UKMT, NCETM, MEI, subject associations and the RI.

The Director chaired the national redrafting groups for the National Curriculum and is a member of the group advising on GCSE criteria and the maths CPD expert group.

## Research

The previous Templeton grant funded three research projects. Steve Hewson's tracking back study on exceptional mathematicians is published at <http://nrich.maths.org/8668>, and the longitudinal project and AskNRICH projects undertaken by Dr W.Y Feng and Libby Jared are in the final stages of being written up and will then be placed on the NRICH site.

## AskNRICH

The work of student volunteers continues to be a key aspect of the success of AskNRICH, <http://nrich.maths.org/discus/messages/board-topics.htm> which is coordinated by Emma McCaughan. The site is looking rather tired now and we intend to use the results of Libby's Ph.D research, together with work of CMEP and the new creativity project, to inform future work in this area. This year AskNRICH has gained 900 new users, with 675 active users in the last 12 months. There have been 5769 posts.

## STIMULUS

STIMULUS <http://stimulus.maths.org/content/> is funded by participating departments, colleges and philanthropic organisations, including, for the next three years, a generous donation from the Winton Foundation. Undergraduates and graduates are placed for school experience with local primary and secondary schools. This year Rob Percival coordinated 254 placements in local schools, supporting teachers in maths and science. Next year we hope to extend the offer to support teachers in the new curriculum area of computer science.

### Mathematicians in Residence

This year was the second when we placed Part Three students into local schools for an extended period of time to support A level teaching. The feedback has been very encouraging both from students and schools and we are actively seeking a small amount of funding to ensure this can continue next year.

## Publications

McClure L (2012) Highly Able Children chapter in *Transforming Primary Mathematics teaching and learning* McAteer M (ed)

McClure L (2013) Should maths be fun? in *Teach Primary* Sept 2013

Woodham L (2013) *The New NRICH Website* in Primary Mathematics Vol 17 Issue 1  
Leicester: Mathematical Association

## Marketing and Publicity

### Facebook and Twitter

Alison has continued to coordinate the social networking of NRICH. We promote our work on Twitter and Facebook; the NRICH Facebook page <http://www.facebook.com/nrichmaths> has a current total of 4000 subscribers and the NRICH Twitter feed <http://twitter.com/#!/nrichmaths> currently has 8970 followers. As well as being instant publicity, we are finding that Twitter is being used effectively to share links to problems in the development stage for users to offer feedback, and also to give our followers 'previews' of our problems before they are featured on the website. Alison is hoping to extend the reach and scope of our use of cutting-edge social networking technology next year.

### Into the future

Alongside the future plans already mentioned, our immediate work will be focused on the Templeton creativity project which will involve web-based activity and workshops with teachers and pupils. We are lucky that we have appointed Fran Watson to coordinate the Hands On Roadshow, based on NRICH tasks and currently coordinated by Sue Hickman-Pinder who is to retire in 2013. Fran will be working with us on the Templeton project and we hope that through this we will design even tighter links between the Roadshow and the NRICH website.

We have started to work closely with Cambridge Assessment and CUP on various aspects of mathematics education and we hope that during the next year the relationship between NRICH and these two other university institutions will become even closer.

Lynne McClure

NRICH Project Director

September 2013

