



The sigma Network

for cross-university mathematics
and statistics support

Annual Report 2012/13



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sigma – Network for Excellence in Mathematics and Statistics Support

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contents



Introduction	2
Steering Group	3
News and events from around the sigma Network	4
North East and Yorkshire Hub	4
North West and North Wales Hub	6
Midlands Hub	7
Eastern England Hub	8
South East Hub	8
South West and South Wales Hub	9
Scottish Mathematics and Statistics Support Network	10
Irish Mathematics Learning Support Network	11
Get involved with the sigma Network	12
math centre and stats tutor	13



David Bowers

Introduction

2012/13 was a watershed year for **sigma**.

The **sigma** CETL was created in 2005 as the result of a successful collaborative bid by Loughborough University and Coventry University to establish a Centre for Excellence in cross-university mathematics and statistics support. Over its five year funded period, the **sigma** CETL generated a wealth of experience and resources which it passed on to the higher education sector in England and Wales, and shared more widely nationally and internationally, creating a valuable legacy for those involved in supporting students to develop their mathematical and statistical skills.

From 2010 until 2012, **sigma** was funded by the national HE STEM Programme to continue to work with the mathematics and statistics support community. It established a network of regional hubs, provided funding and other assistance to establish new mathematics support centres and enhance existing support provision, and funded specific projects.

In 2012/13, with external funding streams no longer available, those involved with **sigma** had to find new ways to maintain the momentum generated over the previous years. The regional hub co-ordinators came together to establish the **sigma Network for cross-university mathematics and statistics support**, to continue the work of **sigma** on a voluntary basis. A national steering group was set up, consisting of hub co-ordinators and other key activists from the regions, to maintain the **sigma** brand and to encourage continued activity and development within the mathematics support community.

We have set up a new, attractive website (www.sigma-network.ac.uk) to promote the **sigma** Network. A new Jiscmail discussion list has also been established (www.jiscmail.ac.uk/sigma-network) where mathematics

and statistics support practitioners can share ideas and information. The regional hubs continued to organise meetings and events, some of which are described in the following pages. In many respects, the transition from financial dependency on a central project to a voluntary network co-ordinated by a steering group has resulted in a greater sense of community among those involved, though the lack of funding has clearly restricted activities. The challenge now is to maintain and grow this spirit. Ways in which you can become involved are described on page 12.

I hope this annual report gives a flavour of the valuable opportunities that can be realised when committed professionals have a framework within which they can work together.

Members of the **sigma** Network will be present at the CETL-MSOR conference, to be held in Coventry on 10-11 September 2013. We will be keen to hear your ideas for the future.

David Bowers
Chair, **sigma** Network

Steering Group

The national steering group of the **sigma** Network is made up of the Hub Co-ordinator plus up to two representatives from each of the six regional **sigma** hubs covering England and Wales. In addition, the steering group may co-opt members for specific tasks.

In 2012/13, the steering group membership was:

David Bowers ⁽¹⁾	University Campus Suffolk	Eastern England ^(*)
Toby Carter	Anglia Ruskin University	Eastern England
Tony Croft	Loughborough University	Midlands ^(*)
Ant Edwards ⁽³⁾	University of York	North East and Yorkshire
Leslie Fletcher	Liverpool John Moores University	North West & North Wales
Duncan Lawson	Newman University	Midlands
Janette Matthews	Loughborough University	Co-opted: website development
Liz Meenan	University of Leeds	North East & Yorkshire
Inna Namestnikova	Brunel University	South East ^(*)
Chetna Patel	University of Sheffield	North East & Yorkshire ^(*)
Christine Pereira	Brunel University	South East
Moirra Petrie	Coventry University	Midlands
Sarra Powell	University of Liverpool	North West & North Wales ^(*)
Julian Priddle	Anglia Ruskin University	Eastern England
Dagmar Waller	Institute of Mathematics and its Applications	Co-opted: conference planning
Jane White ⁽²⁾	University of Bath	South West & South Wales ^(*)
Rob Wilson	Cardiff University	South West & South Wales

(1) Chair (2) Vice-chair (3) Secretary (*) Hub Co-ordinator

The steering group held five online meetings over the year. Regular agenda items included:

- the promotion of the **sigma** Network,
- identifying and encouraging new mathematics and statistics support provision,
- the content and style of the new **sigma** Network website,
- the planning of the 2013 CETL-MSOR conference, and
- sharing ideas for (and evaluation of) **sigma** meetings and events held around the different regions.

Specific strategic issues that the steering group have started to address include:

- the role of the **sigma** Network in furthering the professionalisation of mathematics support practitioners,
- developing a CPD programme for mathematics support practitioners,
- partnership with similar organisations in other countries,
- drafting a formal constitution, and
- identifying future funding streams.



News and events from around the **sigma** Network

Some of the meetings and events organised throughout the year by the **sigma** regional hubs are described below. We also include brief reports from equivalent networks in Scotland and Ireland.

This gives a flavour of the wide range of commitment, professionalism and willingness to share and acquire best practice that exists across the **sigma** Network. Future events will be publicised on our website (see page 12). We look forward to welcoming you at one of our future meetings.

North East and Yorkshire Hub

Initial meeting of a new Statistics Support and Teaching Discussion Group

As the outcome of a workshop at the CETL-MSOR 2012 conference, this meeting was held on 9th November 2012 at the University of Sheffield. It brought together people involved in statistics teaching and support, to share ideas and experiences and establish a supportive network of like-minded practitioners.

The discussions covered various issues that surround the provision of statistics support, some of which are summarised here:

- demand for statistics support appears to be higher than the available supply of statistics tutors;
- difficulties with supporting students while not actually solving the assessment task for students;

- use of methods to provoke students to think about their analysis needs;
- whether statistics is best taught by statisticians or by subject-specific academics;
- maintaining the quality and integrity of statistics as a discipline.

The event was well attended with 24 delegates from 11 different institutions, including a representative from the Royal Statistical Society. Summaries of the discussions are available upon request. It is hoped these discussions will be continued at the CETL-MSOR 2013 conference in Coventry.

The event also included a demonstration by Alun Owen from Loughborough University of **stats**tutor. Alun highlighted the new addition to the site, *Communities*, which allows for the contribution of statistics resources to the site. The collaborative Statistics Dataset Project Resource, once evaluated, will be housed within **stats**tutor. www.statstutor.ac.uk/communities/

*Willingness to share and acquire best practice that exists across the **sigma** Network*

Building online mathematics assessments using Numbas

The North East and Yorkshire **sigma** Hub supported a workshop on 4th July 2013 on *Numbas*, a web-based e-assessment system developed by a team at Newcastle University. Free to use and open-source with a user-friendly interface (see <https://numbas.mathcentre.ac.uk>), Numbas allows the authoring of questions which include randomised content throughout and LaTeX rendering of mathematical notation. Tests provide instant feedback to the student, including rendering of the student's answers in mathematical notation while they type, and a practice mode which lets students regenerate randomised questions for further practice without starting a new session. Example tests are available on the **mathcentre** website.

Nine universities were represented: Birmingham City University, University of Hertfordshire, Loughborough University, Newcastle University, Teesside University, University of York, University of Bath, University of Leeds, University of Sheffield, together with attendees from MEI (Mathematics in Education and Industry) and NMJ technologies.

The day-long workshop, hosted by University of York's Maths Skills Centre and E-learning Development Team and presented by the *Numbas* team from Newcastle University, provided an introduction and training on using *Numbas* and its question authoring facility.

Subject specific mathematics support

Members of the North East and Yorkshire hub met on 15th February 2013 at the University of York's re-located Maths Skills Centre to discuss subject-specific mathematics support with a virtual presentation from Sarra Powell (University of Liverpool), an update on the **stats**tutor dataset resource, and an introduction to *Numbas* from Christian Perfect (Newcastle University).

Australia beckons!

Ant Edwards, Project Officer for Mathematics Support at the University of York, will soon be leaving these shores to take up the post of Lecturer in Mathematics Education at the Swinburne University of Technology, Melbourne. Ant was instrumental in setting up the Maths Skills Centre at York in 2010. He has also been an enthusiastic contributor to the work of **sigma**, most recently as Secretary to the national **sigma** Network. We wish Ant well in his move to Australia, and look forward to seeing reports of a surge in the growth of mathematics support centres "down under". We will stay in touch!



Dr Ant Edwards (centre) with students in the York Maths Skills Centre



Participants at the Numbas Workshop

North West and North Wales Hub

Developing numeracy skills in Nursing

The North West and North Wales Hub organised and hosted a one day event on Friday 15th June 2012 on the theme of supporting the development of numeracy skills in nursing. Professor Kevin Weeks (University Professor of Healthcare Numeracy and Healthcare, University of Glamorgan) began the day by presenting work from a team of international specialists in numeracy in healthcare. The team work in different aspects of numeracy and collectively worked together on a three year numeracy in nursing programme commissioned by NHS Education for Scotland (2007-2010). Professor Weeks offered valuable insights into the benefits and challenges of a longitudinal approach and shared experiences of effective support.

Six universities presented at the event: Salford University, University of Central Lancaster, Queens University Belfast, Kingston University, Birmingham City University and London Southbank University. The day gave educators the opportunity to showcase and share ideas, and the range of presentations reflected the diversity of approaches in supporting the development of nursing students' numeracy skills and included online-blended provision, employability, problem based learning and philosophical approaches grounded in empathy and acceptance.

The day was fully booked to capacity and delegates who travelled from across the country had the opportunity to learn about innovative approaches for supporting numeracy development, as well as a valuable networking opportunity.

Developing students' statistics skills

An event which focussed on supporting the development of students' statistics skills was held at the University of Liverpool on Friday 18th January 2013. Over thirty-five delegates battled with adverse travel conditions and unprecedented snowfall to view presenters from eight institutions: Roehampton University, Birmingham University, Plymouth University, Aberystwyth University, Bath University, De Montfort University, Loughborough University and MEI (Mathematics in Education and Industry). The day was packed with thought provoking approaches to the challenges of supporting statistical skills development in contexts where it is not a core subject.

Embedding statistics support in Psychology – a sigma funded initiative becomes mainstream

An initiative launched during 2013 at the University of Liverpool was the introduction of **sigma** funded drop-in workshops to support undergraduate statistical skills development in the School of Psychology. Based on the recognition that adopting a subject-specific approach to skills development is more effective than generic approaches, and that students' learning can be dramatically enhanced when peer tutored, the initiative adopted a subject-specific peer-tutoring approach. This was underpinned by a blended learning approach where the tutors recorded "problem areas" and identified relevant and useable online resources in these topics. A fully automated online diagnostic test was developed which, when completed, returned an individualised suite of resources to each student, to be used in the workshops and beyond. Evaluation of the provision, particularly the face-to face support, proved extremely positive with 77 students self-electing to attend the drop-ins across a three week period. The provision is now fully embedded in, and funded by, the School of Psychology.



Delegates at the statistics skills event



Duncan Lawson

Midlands Hub

New appointment for sigma Director Duncan Lawson

Congratulations to **sigma** Director Professor Duncan Lawson. After 25 years at Coventry University, finally as the Professor of STEM Education, Duncan has recently been appointed to Pro-Vice-Chancellor (formative education) and Professor of Mathematics Education at Newman University in Birmingham.

Duncan played a major part in the development of mathematics and statistics support both at Coventry in the early years and subsequently on the national scene as the co-director of the **sigma** CETL Project (2005-10). Although Newman does not have a mathematics support provision (yet!), Duncan will maintain a professional interest in mathematics support and continue involvement with the **sigma** Network.

Comprehending Mathematical Proofs

On 24th July 2013 the Midlands **sigma** Hub at Loughborough University hosted an event under the theme of *supporting the specialist mathematician*. Although proofs are central to mathematics, many empirical studies have demonstrated that students find them extremely difficult to understand. This workshop discussed:

- what does it mean to understand a mathematical proof?
- how can students be encouraged to read proofs more effectively?,
- what are the different strategies used by students and mathematicians when reading proofs?

Speakers included Lara Alcock and Matthew Inglis from Loughborough as well as visitors from the US.

"A resource in a day" – mathematics support resources workshop

The Midlands Hub at Loughborough University is planning an event (18th September 2013) aimed at facilitating the production of new text based resources for use in mathematics support centres. Technical assistance will be available in a number of areas such as the type-setting of text and mathematical equations and the production, annotation and inclusion of diagrams, graphs, screen captures and photographs. It is intended that delegates will draw on the expertise available to produce a completed resource in one day. A simultaneous peer review process will ensure the mathematical integrity of the resources produced which will then be hosted by the **mathcentre** Community Project (www.mathcentre.ac.uk/communities/).

First Steps in Evaluation and Scholarship in Mathematics and Engineering

A workshop *First Steps in Evaluation and Scholarship in Mathematics and Engineering*, run jointly with the Higher Education Academy and the University of Birmingham, was held in Loughborough on 28th May 2013. The aim was to explore embedding a scholarly approach to teaching and learning within mathematics and engineering, and to equip participants with the tools and methodologies needed to better understand their teaching practices. The workshop was attended by 15 delegates some of whom then had the opportunity to follow-up with further events at the University of Birmingham in June.

Eastern England Hub

Establishing, sustaining and developing mathematics and statistics support

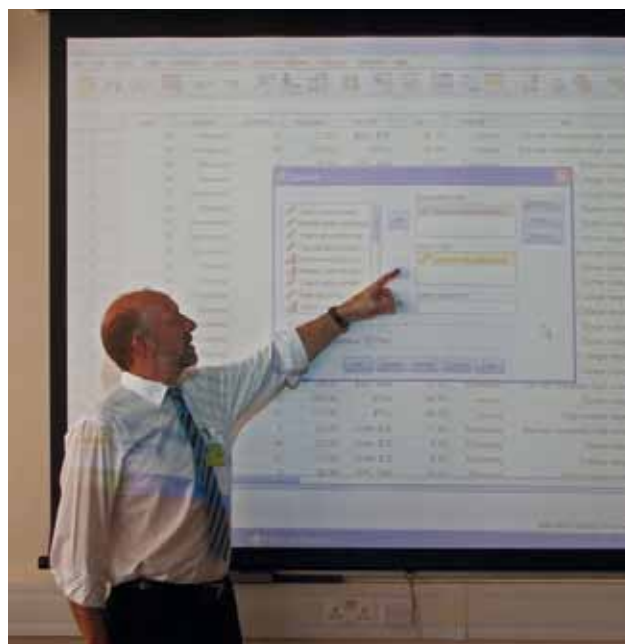
The Eastern England **sigma** Hub held a meeting on 27th February 2013 on the theme of establishing, sustaining and developing mathematics and statistics support. Seven universities were represented: Anglia Ruskin University, Brunel University, Bucks New University, University of East Anglia, University of Essex, Queen Mary University of London and University Campus Suffolk.

This half day workshop, hosted by Anglia Ruskin University, provide a forum for the exchange of ideas and experiences. Universities with new mathematics support centres had the opportunity to learn from – and challenge – practices at more established centres. Short “lightning presentations” combined with question and answer sessions and “speed dating” discussion. The meeting established a local network of like-minded practitioners who share the goal of a thriving and vibrant mathematics and statistics support service at their institution.

SPSS Boot Camp

Statistics and quantitative data analysis techniques are increasingly used in “non-mathematical” disciplines such as the social sciences and humanities, as well as in the STEM subjects. This places an increasing demand on tutors, lecturers and learning assistants who support students in this area, either through in-course tutorials or through mathematics support centres or other central academic skills provision.

This event – held on 12th June 2013 at University Campus Suffolk – addressed an emerging need on the part of mathematics support tutors who might be less confident with statistics than other areas of mathematics and numeracy, namely how to use (and support students to use) the popular statistical software package SPSS. We covered: the SPSS interface; defining variables and coding data; producing descriptive statistics and graphs; correlation; simple significance testing; interpreting the SPSS output window. Fourteen participants from nine universities across the region and beyond registered for this intensive “boot camp” training!



SPSS Boot Camp: “Make sure you get this right...”



Dr Abdel Salhi (left) and staff at the Essex Maths Support Centre

New Maths Support Centre at Essex

The University of Essex has established a new Maths Support Centre, based in the Department of Mathematical Sciences but open to all students. In an innovative twist, the centre is also open to requests for mathematical and statistical advice from local businesses, offering a free initial consultation prior to potentially escalating this into more formal consultancy or training. Students at Essex are increasingly well served with mathematics support, with the central University Skills Centre also offering in-sessional numeracy courses and screening tests. The Eastern England **sigma** Hub has been instrumental in advising and mentoring both of these initiatives.

South East Hub

SPSS tutorials hosted on YouTube

A substantial project this year within the South East **sigma** Hub, led by Dr Christine Gregory, was the creation of a suite of short SPSS video tutorials. Initially hosted on Brunel University's VLE, they proved so popular that they have been recently transferred to Brunel's own YouTube channel, where they are now freely available to the mathematics and statistics support community.

www.youtube.com/user/BrunelASK



South West and South Wales Hub

Summer project – the experience of student interns working in mathematics support centres

The **sigma** South West Hub held a Summer Project Meeting in July 2012 where student interns based at the Universities of Bath, Cardiff and Plymouth talked about their work within mathematics support centres. This followed the very successful intern programme within **sigma** South West which culminated in a plenary lecture at the 2012 CETL-MSOR conference.

The project based in Cardiff was to explore the potential of Sage mathematics software to support learning. Projects based in Plymouth focussed on use of audience response devices and *Maple TA*. The projects in Bath were undertaken by BTEC students to develop mathematics support and resources for students with vocational qualifications entering science based disciplines in selective universities.

Two presentations linked to these projects were also delivered at the 2012 CETL-MSOR conference in Sheffield: David Graham (Plymouth) spoke about audience response systems and Jane White (Bath) about support for vocational entry students.

Accessible learning resources in mathematics

sigma South West continued to support work on mathematics accessibility in conjunction with the HE STEM funded grant "*Methods to produce flexible and accessible learning resources in mathematics*". It co-hosted a workshop in January 2013 at the University of Bath on accessible learning resources in mathematics with invited speakers Volker Sorge (Birmingham) and Jonathan Fine (OU). Emma Cliffe (Bath) provided an overview of project outcomes.

Workshops on graduate numeracy tests

The workshop on graduate numeracy tests, which unfortunately had to be postponed in July 2013, will be offered again in 2013/14. With the increased focus on the employability of graduates, this timely workshop is sure to prove popular across the Hub region and beyond.

Scottish Mathematics and Statistics Support Network

The inaugural meeting of the Scottish Mathematics and Statistics Support Network was held at the University of St Andrews back in 2008, supported and funded by **sigma**. The SMSN maintains close links with the **sigma** Network in England and Wales, sharing the aim of disseminating experience and good practice among those who run mathematics and statistics support provision in higher education. We maintain our own mailing list, and have recently revised our website: <https://sites.google.com/site/scottishmsn/home>.

Standards-compliant online assessment tools

This QTI-PET workshop, led by Sue Milne and Niall Barr, was held at Glasgow University on 26th October 2012 attended by 12 representatives from 7 institutions. Expert presentation, hands-on practicals and discussions combined to give a broad overview of the technicalities of designing, authoring and implementing standards-compliant online assessments for mathematics and related areas.

SMSN Annual Meeting

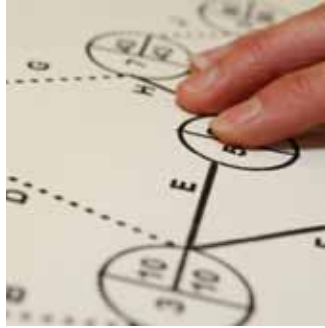
The Annual Meeting of the Scottish Mathematics and Statistics Support Network was held at the University of Aberdeen on 28th June 2013, attracting twenty delegates from eleven universities. Keynote speaker was David Bowers, Chair of the **sigma** Network, who talked about the continued relevance of mathematics support in a period of transition. Other speakers also picked up the theme of transition, not least against the backdrop of the new *Curriculum for Excellence* in Scottish schools and its potential impact on the mathematical skills and expectations of students when they start university.



David Bowers and Morgiane Richard at the SMSN Annual Meeting



Members of the Scottish Mathematics and Statistics Support Network



Irish Mathematics Learning Support Network

The IMLSN was established in 2009 to bring together individuals and Higher Education Institutions who are involved in the provision of Mathematics Learning Support on the island of Ireland. The original inspiration for the IMLSN was the success of **sigma**.

<http://supportcentre.maths.nuim.ie/mathsnetwork>.

7th Annual Workshop

We have continued with our annual workshops which deal with topics deemed to be of most current importance to the IMLSN. The 7th workshop took place at Queen's University Belfast in December 2012, attracting 26 delegates. The conference theme was *Promoting Learning Support and Engagement with Mathematics: a discussion of all avenues of approach including the use of technology*. The keynote speakers were Professor Sarah Moore (University of Limerick) and Dr Paul Andrews (University of Wales, Newport). Full details of the conference and some of the presentations are available from our website.

The development of template materials and topics for tutor training sessions

We are working on collecting existing materials, e.g. from **sigma** and the HEA, and collecting the experience and wisdom of tutors who have been involved in mathematics learning support for a long time, to produce some template tutor training sessions which our members can use in their own institutions.

National survey of student opinion on mathematics learning support

As a result of this national survey, we received 1633 completed questionnaires from 9 HEIs. We have submitted four journal papers and will produce a final report ready for autumn 2013. The outcomes will be communicated nationally and internationally.

*The original inspiration for the IMLSN was the success of **sigma***

Get involved with the **sigma** Network

People involved with cross-university mathematics and statistics support come from a broad range of backgrounds.

The **sigma** Network includes:

- specialist mathematics and statistics lecturers,
- study skills tutors,
- learning developers,
- student peer learning leaders,
- departmental managers,
- educational researchers,
- learning technologists,
- and many others with a general interest in the teaching and learning of mathematics and statistics.

There are several ways you can become involved in the **sigma** Network:

- (1) Visit our new website at www.sigma-network.ac.uk. We intend the website to contain news and

updates of events relevant to mathematics support practitioners, but also to include links to resources and key documents dealing with the theory and practice of mathematics and statistics support. So please don't just browse the website, let us know of content that you would like to see included.

- (2) Subscribe to our free email discussion list at www.jiscmail.ac.uk/sigma-network. This will put you in touch with a growing number of like-minded professionals with an interest in cross-university mathematics and statistics support.
- (3) Get in touch with the co-ordinator of your local **sigma** hub (contact details on the website). The regional hubs are always keen to hear from new people working in mathematics and statistics support, especially if you have ideas for local or national meetings and events and could help to organise them.



The new website of the **sigma** Network



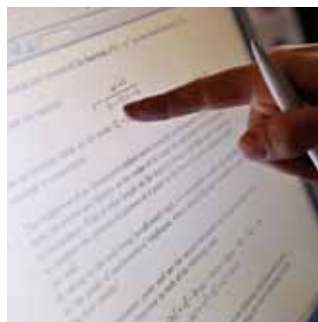
mathcentre (www.mathcentre.ac.uk) and **stats tutor** (www.statstutor.ac.uk) provide online open access mathematics and statistics resources to support students in all disciplines in their study of mathematics and statistics. The sites are also repositories for resources such as guides and research papers for mathematics and statistics academics and support practitioners working with students.

Developed in 2003 by a group from the Universities of Loughborough, Leeds and Coventry, the Maths Stats and OR Network and the Educational Broadcasting Services Trust and upgraded in 2009 with funding from JISC, **mathcentre** is highly regarded by the sector, and used as a repository for high-quality formative assessment resources, such as Numbas (Newcastle University) and Maths EG (Brunel University).



statstutor was developed by staff from Loughborough and Coventry Universities and also the **sigma** Network (<http://sigma-network.ac.uk/>), with contributions from the Royal Statistical Society's Centre for Statistical Education as well as a number of other colleagues from other HE institutions in the UK.

The Communities area of both **mathcentre** and **stats tutor** facilitate the contribution of high quality peer reviewed resources developed elsewhere so that these resources may be made available to the wider mathematics and statistics support community.



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