sigma Σ network for excellence in mathematics and statistics support

NEWSLETTER

Issue 22: Spring 2021

Editor's Note

It is with pleasure; I present the Spring Edition of the **sigma** Newsletter 2021. It has already been more than a year that we've been working under lockdown conditions and, as we work mainly from homes, there has been fewer opportunities to spontaneously interact with colleagues and as such the need to feel a part of a community is felt more acutely. The **sigma** Network mailing list has been a good source of interaction with other practitioners so get involved. The articles in this newsletter provides some experiences and musings of maths and statistic support community of practice.

Beginning with a personal reflective piece on working from home by Lois highlighting the huge leaps we've made in Digital Learning and Teaching and the drawback of the same technology. There's still time to continue catching up with reading and Peter shares his review of a book he has enjoyed and found useful.

Mirko and colleagues in Germany summerised the event they held to broaden shared practice and interests. This collaboration and networking are expected to continue and develop. The Scottish Maths Support Network have been considering the accessibility of digital technology and Morgiane, Shazia and David have provided a summary of their findings for various tools which will help to increase the accessibility of mathematical material (hopefully without too many references to animals in captioning!).

Wahiba has provided an article on developing a community for students to help ease the sense of isolation especially poignant currently, but you can see its relevance in the longer term too. Happy Pi day!

Finally, a notice from Mark of the coming CETL-MSOR 2021 conference in Coventry. "Celebrating our past, embracing our future", is very welcome and give us something to plan towards and look forward to!

A big thank you to all authors for their contributions to this edition. The deadline for contributions for the next edition (Autumn 2021) is **27th August 2021**. We welcome contributions on any topic that may be of interest to practitioners and academics supporting higher education students in their learning of mathematics and statistics. To submit an item, see please use the templated attached in the email.

Finally, as usual: the views expressed do not necessarily constitute recommendations from the **sigma** Steering Group or any associated parties.

Happy Reading

– Chetna Patel

A light-hearted reflection on a year of teaching from home.

Lois Rollings
Maths, Stats & Numeracy Lecturer | Middlesex University
L.Rollings@mdx.ac.uk

As I write this it is very nearly a year since I last saw a student in the flesh. I remember a colleague musing at the time that we wouldn't be back on campus before September – he just forgot to specify the year.

So what have I learned over this time?

- Zoom is not just an ice lolly remembered from childhood summers.
- What a Wacom tablet is and how you can use it to write on PowerPoint slides and that this might be useful in future in classrooms with tiny whiteboards.
- How much I value the support of the mathematics & statistics community, both within and across institutions and how things would have been a lot harder without it.
- When the primary school over my back fence is open, playtime is not the best time to record a video.
- Whenever possible it is good to schedule breaks between online sessions.

Figure 1 – Taking a break from Zoom in the local park

- Students are grateful for our support – but some still don't show up for appointments.
- I won't miss seeing my face as I teach and having to check that my background doesn't feature too much mess.
- Auto-captioning software was clearly not trained on mathematics videos but there are moments of light relief when the mishearing verges on the absurd. For some reason animals seem to crop up quite a lot. Here are some of my favourites:

Figure 2 – Fibonacci spirals in a sunflower grown from seed kept me cheerful

- Messy is the termites yeast.
- I can actually see my chart squirrel.
- The owners of the animals that eat your patients.
- Cat video set to come up with a fraction first.
- Repeated oinking.
- In order to be able to do the dog analyzation.
- LeBon, 28 by twenty apes and three sevenths.
- Divide through by monocytes.

Lockdown book: The Art of Statistics by David Spiegelhalter (2019)

Peter Mitchell
Part-time Tutor | Mathematics and Statistics Help, University of Sheffield
P.L.Mitchell@Sheffield.ac.uk

Last March I received this book as a birthday present, with more time to read it in the first coronavirus lockdown. Spiegelhalter takes examples from everyday life, examines the data, and applies some analysis, including statistics when needed. He concentrates on topics to which classical statistical techniques can be applied. These are explained in simple terms, with any equations relegated to the glossary and notes at the back. The glossary and index are excellent. I learnt a lot from this book (further notes available on request) and here will share the point made about populations.

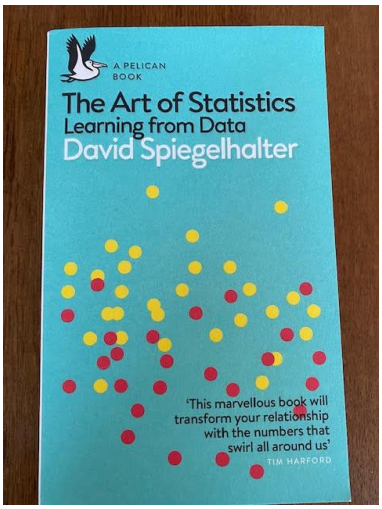

Figure 3 The paperback edition was published in March 2020.

In chapter 3, three types of population are defined.

(a) Literal population: the usual definition, an actual identifiable group of units or subjects.

(b) Virtual population: measurements taken with equipment. We could always take more measurements and get varying results arising from the precision of measurement and the stability of the circumstances. The virtual population is all the measurements that could be taken given enough time.

(c) Metaphorical population: where the data are complete (e.g. all the murders in a defined place in a year; or the examination results for all the children in the class) and there is no larger population at all. "This is an unusual concept. Here we act as if the data-points were drawn from some population at random." Clearly this is not true because the data are complete, no more could be collected. The data observed can be thought of as having been drawn from an imaginary space of possibilities, as if history had played out differently, and data come from only one of the possible states of the world. The set of all alternative histories is the metaphorical population.

The idea of metaphorical population solves a conundrum that I encountered as an undergraduate. An examination question in statistics for biologists provided the frequency (counts) of wet days for a period of years by day of the week. The question was whether Thursday, with the highest count, was the wettest day of the week for this period. Candidates were expected to carry out a chi-squared test with a null hypothesis of equal probability of wetness for each day of the week. However, the examiners found that they had to give full marks to the one candidate who simply pointed out that there was no doubt: given the complete set of data for the period it was a matter of fact that Thursday was the wettest day! This case has always made me wary of setting questions for assessments using the chi-squared test. Spiegelhalter's definition of a metaphorical population would justify use of the chi-squared test if we take the view that the observed data were one sample of many sets that might have been found for that period of years.

This sort of problem crops up in MASH sometimes. For example, geographers can have complete runs of geological or weather data. In education, test results may be available for the whole class or the whole school. Use of the metaphorical population, to justify use of inferential statistics on sets of data that are complete, will become increasingly common as more and more data become available and accessible; I am glad that I read about it first in Spiegelhalter's book, which I recommend highly.

Opportunities and Possibilities of a Network of Mathematical Learning and Support Centres in Germany

Mirko Schürmann	University of Paderborn
mirko.schuermann@upb.de	
Michael Liebendörfer	University of Paderborn
Lara Gildehaus	University of Paderborn
Niclas Schaper	University of Paderborn
Reinhard Hochmuth	University of Hannover
Rolf Biehler	University of Paderborn
Elisa Lankeit	University of Paderborn
Christiane Kuklinski	University of Hannover
Johanna Ruge	University of Hannover

The WiGeMath Transfer Project Team of the Universities of Paderborn and Hannover and the Centre for Higher Mathematics Education (www.khdm.de) invited staff and directors of German learning and support centres for both mathematics and its didactics to exchange views on common interests and possibilities of networking. Thirty representatives of 26 learning centres located at universities or universities of applied sciences in Germany took part.

At the beginning of the online workshop, Prof. Duncan Lawson (Coventry University) presented the possibilities of an association of learning and support centres in the form of a network for mutual exchange and cooperation. He reported on his extensive experience from Great Britain and outlined the development process of the sigma network, which, after initial project funding in the 1990s and 2000s, has developed into a community that now also includes many international partners from different countries. He proved the thesis that a network is more than the sum of its parts by presenting many results that have been produced within the network. The annual conferences, jointly produced publications and the provision of extensive materials on the homepage as well as the mailing list were particularly emphasised.

The potentials of a network in Germany were demonstrated by Lara Gildehaus (University of Paderborn) when she presented study results on the spread of learning centres in Germany and their characterising features (Schürmann et al. 2020). By analysing 190 homepages of higher education institutions, a total of 61 mathematical learning centres and 18 mathematics didactics learning centres were identified and described.

A selected number of six learning centres have already been comprehensively evaluated as partners of the WiGeMath project in 2016–2017. An insight into the findings and results obtained was given by the presentation of Prof. Dr. Niclas Schaper (University of Paderborn). In addition to the high satisfaction of students with the offers of learning centres and the received support, differences between users and non-users of learning centres as well as information on support occasions and subjects were presented and discussed.

A first round of breakout sessions offered the participants the opportunity to get to know each other and to exchange experiences on the topics of support in mathematics delivered by tutors, support in mathematics delivered by staff and support in mathematics education. The objective of the second round of breakout sessions was to gather common interests for networking and to identify topics for future cooperation. In three groups, possibilities for exchange and cooperation in tutorial training, evaluation and research, as well as the current challenges and possibilities of online offers in learning centres were discussed.

In the joint closing and discussion round, the results of the sessions were compiled, and live queries were made on possible topics for cooperation in a network and on forms of exchange. The majority of the participants wished for a common homepage for mutual exchange and for the provision of materials. A uniform description of the respective learning centres could also be provided there for the public. In order to promote direct and simple exchanges between participants, we set up a mailing list, and the creation of a forum was discussed. In an online survey, the participants named tutor training, materials, evaluation, regular exchange of experiences and online formats in counselling as desirable thematic focal points for future exchange.

In a final discussion, there was consensus among the participants to continue the network activities and to concretise this in a further meeting. The event team of the workshop will co-organise a next meeting. Further information on the network and the possibility of joining a mailing list is available at https://www.khdm.de/ag-uebergreifende-projekte/wigemath/lernzentren.

A special and final thanks to all speakers, facilitators and participants for their commitment! We look forward to further cooperation and especially to more network partners.

Reference

Schürmann, M., Gildehaus, L., Liebendörfer, M., Schaper, N., Biehler, R., Hochmuth, R., Kuklinski, C., & Lankeit, E. (2020). Mathematics learning support centres in Germany—An overview. Teaching Mathematics and Its Applications: An International Journal of the IMA, hraa007. https://doi.org/10.1093/teamat/hraa007

ARTICLES

Scottish Maths Support Network – Digital Accessibility

Morgiane Richard

Academic Skills Adviser (Maths)
University of Aberdeen
m.richard@abdn.ac.uk

Shazia Ahmed

L&T Skills Coordinator
University of Glasgow
Shazia.Ahmed@glasgow.ac.uk

David Hodge

Academic Development Tutor (Maths)
Glasgow Caledonian University
David.Hodge@gcu.ac.uk

The virtual Digital Accessibility event, hosted by Morgiane Richard at the University of Aberdeen, took place on Friday 29 January with the aim of exchanging ideas and sharing thoughts on the progress made on making

mathematical teaching material accessible. There was a very strong interest in discussing how to make LaTeX-generated documents accessible.
David Hodge (at GCU), Shazia Ahmed (University of Glasgow) and Morgiane Richard (University of Aberdeen) all shared their experience with Pandoc, RMarkdown and Bookdown, with similar results. Pandoc works well with short and simple Latex files but was of limited use for longer and more complex documents. RMarkdown/Bookdown gave more satisfactory results.

David and Shazia also tested accessibility Latex packages, finding 'axessibility' was capable of creating files that pass accessibility tests but not being sure if they are genuinely accessible to screen readers.

David spoke about using html rather than pdf for student notes, to allow for font resizing, and screen reader options for students presenting one example of bespoke html created from lecture notes and a second example creating standalone pages of maths using RMarkdown rendered into html.

Morgiane mentioned experiencing difficulties with uploading and correctly displaying html files in Blackboard. David also spoke about the use of iframes to embed html pages including MathJax into Virtual Learning Environments which don't like the use of javascript (for MathJax).

Shazia presented some examples of html files uploaded on Moodle, touched briefly on Blackboard Ally and looked at accessibility options in Moodle. It was felt that students and staff needed more awareness of accessibility tools within VLEs.

Christian Lawson-Perfect from Newcastle University talked about CourseBuilder, which they use at Newcastle University to convert LaTeX lecture notes to html (https://github.com/coursebuilder-ncl/makecourse).

We note that LaTeX-generated PDF remains the most appropriate document format in the majority of cases. Although MathJax is deemed the best solution to render maths in an accessible way, it does not perform well in some cases. This is a concern for staff, as Maths wrongly read aloud will have detrimental consequences for learning. There is also concern amongst academics that any migration towards a new typesetting language will be extremely time-consuming.

ARTICLES

Support learning through creating a sense of belonging to a mathematics community

Wahiba Toubal
Programme Leader for Mathematics | Bishop Grosseteste University
wahiba.toubal@bishopg.ac.uk

Creating a sense of community has been more important than ever, structures can be put in place by mathematics practitioners to prevent students from feeling isolated and avoid a decline in their excitement about studying mathematics. We are particularly interested in 1- how to connect with students other than through lectures 2- how to reinforce their excitement and their sense of belonging to both the department and the wider mathematics community.

I have recently started in my new position at BGU which led me to reflect on these issues and some simple solutions for the long term. It's not only about engaging students in mathematical mindset activities but also provide them with a sense of belonging, creating opportunities for student involvement and encourage them to share their ideas to make them feel part of the wider exciting mathematics community. The key word is connection: connect with lecturers through interactive sessions, connect with peers, connect with the wider mathematics community.

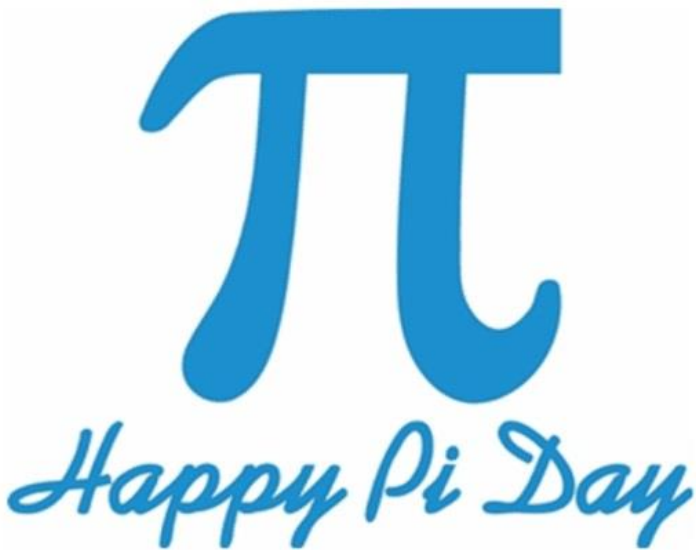

Figure 4 – 146th March is Pi day

Here are the TOP FIVE tips from the mathematics department at BGU on how to engage students, promote a sense of community to support with their learning. These are currently done online but will continue face to face. Once put in place these projects can be student led, adding a layer of student involvement.

1-Mentor scheme for students for support

Connecting students and giving them a chance to support peers contributes to building a sense of community. Some of our third-year students are mentoring foundation students. This has had a very positive impact for both parties. Foundation students feel they have extra support in terms of their mathematics learning and general well being.

2- Mathematician of the Month Event for inspiration

We've launched Mathematician of the Month event on our social media. Each month our students are asked to choose a mathematician they'd like to talk about and promote. Through studying mathematics they have inherited theories developed by the most brilliant minds and we want them to be excited and inspired by this. For March we've had a high number of suggestions of female mathematicians.

3-Promoting maths/stats related days for celebration

STEM day, World Statistics day, Pi day etc so many mathematics related celebrations! Promoting these days among students makes them feel like they are a part of an exciting community. These days are also an opportunity to bring awareness on current problems in mathematics/statistics and set adapted challenges to be tackled by students. The mathematics department at BGU will be celebrating Pi Day on the 14th March!

4- Student Mathematics Newsletter for reflection and expression

Letting students reflect and write about their own experiences is empowering and increases their sense of ownership. It is a great chance to engage and reflect on their mathematics learning. They can share information, opinions on mathematics content or tools they have been using.

5- Coffee catch ups for relaxation

Excellent to do fun math quizzes and creates opportunity to have a relaxed chat around mathematics and its applications in an unformal setting.

CETL-MSOR 2021 - "Celebrating our Past, Embracing our Future"

Mark Hodds
Chair of the CETL-MSOR 2021 organising committee | Coventry University
Ab7634@coventry.ac.uk

The 2021 CETL-MSOR conference will be held at Coventry University with the theme of "Celebrating our past, embracing our future". It will take place on Thursday 2nd and Friday 3rd September 2021 and will be the first hybrid event with both in-person and online attendance and presentation possibilities (subject to restrictions).

Our confirmed keynote speakers are:

- Professor Tony Croft, Emeritus Professor of Mathematics Education, Loughborough University
- Neil Sheldon, Chair of the Teaching Statistics Trust and former Vice President of the Royal Statistical Society
- Professor Ralf Biehler, Professor of Mathematics Education, Paderborn University, Germany
- and giving our traditional closing plenary session
- Dr Joe Kyle, Formerly of the Department of Mathematics, University of Birmingham

More details regarding the conference will be provided shortly via our conference webpage: http://sigma.coventry.ac.uk/cetlmsor2021. In the meantime, as part of our celebration of 30 years of Mathematics and Statistics Support at Coventry University, we would like your pictures of the past and present of mathematics support at your own institutions for a display at the conference. Please send your pictures to: sigmamathscoventry@gmail.com

We are looking forward to welcoming you to Coventry in September 2021!