



London Academy of Excellence
(Worshipful Company of World Traders)

of World Traders) and Mulberry Academy Shoreditch (Worshipful Company of Chartered Secretaries & Administrators), the first of which was the overall winning team.

Again Court 1 was the location for this impressive Final, redolent of celebrity criminal presences in the Dock such as the Kray twins, Dr Crippen, the Yorkshire Ripper and Ruth Ellis. In this event the Dock was graced by innocent celebrities: Dr Lis Goodwin, Immediate Past Master of the Educators, and Andrew Marsden, Chair of the FSG; the



Mulberry Academy Shoreditch (Worshipful Company of Chartered Secretaries & Administrators)

court officials had to lock the door leading into the Dock from the cells below to avoid unwelcome intruders!

As last year, the Educators managed the event with Master Pam Taylor strictly keeping time, Immediate Past Master Lis Goodwin who had taken on the difficult role of Moderating Judge to achieve consistency across the Heats and Liveryman Anne Punter sorting other matters.



The winners: King's College London Mathematical School (Worshipful Company of Actuaries)



Sponsored by the Financial Services Livery Companies (FSG) and administered by the Worshipful Company of Educators



Livery Education Conference, 3 March 2020

The seventh conference for Headteachers of London secondary schools together with representatives of the Livery Companies of the City of London was held on 3 March 2020. The conference is organised through the Educators together with Livery Schools Link (LSL) and the Actuaries' Company. The first such conference held in 2014 arose from a discussion between the then Master Actuary and Past Master Peter Williams.

For the first five years, the half-day conference was held in Staple Inn on High Holborn which is the home of the actuarial profession. We are now enjoying the opportunity to see some Livery Halls. This year, thanks to the generosity of the Merchant Taylors' Company, we were in their beautiful Hall, where we were very well looked after. The audience of about 90 people consisted of Headteachers, or a member of their senior management team who usually has responsibility for careers education, and Masters or senior members of Livery Companies.

The underlying theme of all the conferences to date has been how schools and Livery Companies can work together to help young people as they move from the school environment towards the world of work. This year the theme was Preparing Young People for the Future. The conferences follow a similar pattern: two keynote speeches: two more practical accounts on current issues; and examples of how schools and the Livery can work together. On arrival, participants are allocated to a table that has a mix of Livery and schools' people. The two discussion group sessions during the morning provide opportunities for the sharing of ideas between schools and Livery representatives.

The current Lord Mayor has been present at each of the conferences—and this year was no exception. We were fortunate that the Lord Mayor Alderman William Russell joined us around the coffee break and gave a short presentation on the importance the City of London places on education.

The first keynote speaker was one of the Sheriffs, Alderman Dr Michael Mainelli, who gave a fascinating account of what he saw as the frontiers of education (a copy of this speech appears elsewhere in The Educator). The second keynote speaker was Tom Ravenscroft, CEO of Skillsbuilder, who was also one of the speakers at the then current Master's seminar programme. His interest is in the

perceived gap between the skills needed in the world of work and the basic skills which are learnt at school such as literacy, numeracy and IT. Described variably, for example, as 'transferable', 'essential', or 'fusion' skills, these may be summarised as communication, interpersonal, self-management and creative problem-solving skills. The Skillsbuilder programme looks at how to develop these skills as children progress throughout their time at school.

The first of the two practical sessions, given by Bill Twigg of City and Guilds, was on the development of apprenticeships and T levels. The second was on the London Careers Festival. Sadly, the Festival has now been postponed until 2021 because of the current health situation.

For many who attended the event, the discussion groups were the highlight. The key themes presented in the feedback from each group were:

- the need to embed work skills and careers education throughout the school curriculum
- the need for more publicity for schools on the availability of apprenticeships
- the need for work experience placements of different types to be offered and publicised in schools
- the opportunities for Livery Companies to ask their members to provide much-needed help to schools in the provision of work experience and in the general development of essential skills

The conference was considered to be a success overall, and the organisers—Past Master Lis Goodwin and Court Assistant Sarah Miles—thank all their stalwart helpers who made it so, and particularly: Past Master Actuary Martin Miles; Maureen Marden; Christine Smith; and the Master and staff of Merchant Taylors' Hall. The Educators' schools' team, led by Liveryman Christine Smith, worked hard in contacting schools to get their participants. If any Educators are interested in helping LSL please contact Lis, Sarah or Christine via the Clerk.

Report: Court Assistant Anne Punter

Education Committee Events

Master's Seminars 2018-2019: Mathematics Education

Introduction

The 2018-19 Master's seminar series examined the importance of mathematics in the world and particularly for young people going forward into the world of work. There are challenges for educators in helping students to understand the relevance of mathematics to all subjects and the impact it will have on their future career journey. The first and last of the five seminars looked at how mathematics affects current and future careers. The second and third seminars looked at mathematics teaching in the primary and secondary school stages and the fourth seminar covered innovative ways of helping develop mathematics understanding.

Seminar 1: Maths and a Data Rich World, 19 November 2018

The first of the Master's Seminars was provided by the Education Policy Director for the Royal Society. The Royal Society is the longest established Science Academy in the world and provides a forum for the discussion about the Science and Engineering, with a focus on policy for education in a number of spheres. It publishes policy documents and provides advocacy to government from a prestigious learned society.

Dr Rosalind Mist—originally a physicist and a rocket scientist—talked about the importance now of understanding and adapting



to the so-called data age. She talked about the impacts of data science, artificial intelligence and machine learning. The Royal Society's research into machine learning and the public's attitudes to its increasing use in everyday life was published in 2017. She argued that the ways in which education needs to adapt shift continually. The Data Age is one new change. Mathematics and its associated skills are an important component. The use of artificial intelligence—or, more precisely, machine learning—will need to be covered in school learning about its technical features and about its ethical and society impacts. Computer curricula need reviewing and the Royal Society is collaborating with other organisations to reflect the changes in IT and how this impacts teaching and learning: see <https://royalsociety.org/topics-policy/projects/computing-education/>. Recruiting new computing teachers is vital, particularly new recruits with an understanding of data in its widest sense and particularly how machine learning is affecting a range of sectors of industry and commerce—including, in the longer run, education itself.

It was interesting to understand how the Royal Society works with its elected members—over 1,500 leading scientists and engineers—to understand and influence policy in education and other more technical fields, such as climate change. The discussion during the Seminar was a detailed and deep and we were pleased to welcome members of other Livery companies to the event.

Seminar 2: Primary Mathematics, 14 January 2019

The presenter, Kieran Mackle, is Project Leader of a three primary school project in an area of North Kent. The schools have a substantial proportion of pupils on pupil premium funding and who have a particular need for a supportive educational environment. By virtue of a series of interventions, mathematics as a core subject is being provided to a high level in the schools. One of the Headteachers attended the seminar and some video of projects were shown, followed by a full discussion of the details of the work outlined and of the impacts on Primary Mathematics generally.

The Gravesham Mathematics Collaboration, which started in September 2017, is funded by the Goldsmith's Company (some of whose Members and Administrators joined the seminar). Gravesham is an area with low educational achievement amongst adults, which impacts local children in expectations and support. In the Collaboration, the schools are provided with extra support for pupils with low achievement and confidence in Maths. Projects and lessons are provided with professional development support. Pupils working in groups are encouraged to discuss ideas on mathematical content. There are more external links than would be possible in most schools. Kieran acts as an extra teacher as well as coach and mentor for the classroom teachers. Parents are involved to some extent. Overall the extra emphasis on Mathematics—alongside work on the necessary literacy skills—appears in the short-run to add confidence to teachers and their pupils.

There is external support from local Universities, researching measurable impacts of the programme. A group of the teachers that went to Singapore with Kieran to look at mathematics teaching came back with a number of ideas that they are putting into practice. The possibility of visiting the schools was raised but has been obstructed by Covid 19.

Seminar 3: Secondary Mathematics, 4 March 2019



Charlie Stripp is the Chief Executive of the mathematics education charity Mathematics in Education and Industry (MEI) and also the Director of the National Centre for Excellence in the Teaching of Mathematics (NCETM). The latter organises the national programme of Maths Hubs for the delivery of CPD. He outlined the qualifications background and the rate of participation and success in the national GCSE and A2/AS examinations in England. AS Mathematics is a good qualification, normally taken in the first year after GCSEs and helpful in a range of future work and University settings. England stands alone among other Western countries in not requiring the study of Mathematics post 16. Charlie also discussed the continuing challenge for students who need to reach grade 4 Maths or its equivalent and who, if they have not achieved this at GCSE level, need to continue to work on Mathematics.

There is a new qualification—Core Mathematics—which enables students to continue with Mathematics that is more applied. This helps in further study and with careers. Because not all higher achievers in Mathematics at GCSE—level 5, 6, 7—continue with Maths, there is a desire to raise the understanding of the advantages of continuing with Mathematics. The Advance Mathematics Support Programme has been set up to help raise the number of students reaching level 3. This was one outcome of the Smith Report on Mathematics (2017): see <https://www.gov.uk/government/publications smith-review-of-post-16-maths-report-and-government-response>

There are continuing problems with recruiting and retaining Mathematics teaching staff. Providing and paying for professional development to improve knowledge and skills is often difficult to arrange. Many teachers of Maths are not well-qualified in the subject. Charlie spoke about international comparisons and the impacts of different styles of teaching Maths. Areas of known success, such as Singapore, have a different level of funding and a different Mathematics culture in schools and in society as a whole.

Seminar 4: Technology and Mathematics—a natural human progression, 15 April 2019



Alison Clark-Wilson is a former secondary school mathematics teacher who now works as a Principal Researcher at Knowledge Lab at University College London's Institute of Education. She has been developing, evaluating and researching mathematical technologies since her first year of teaching in 1993, when she participated in the first pilot study of graphing calculators in UK classrooms. She has worked internationally on several government and industry-funded teacher and curriculum development projects involving the use of innovative mathematical technologies. Most recently, she completed a three-year project funded by the Nuffield Foundation on digital pedagogies for mathematics teaching. This extends previous work.

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Few people consider the original human-made mathematical tools, such as compasses, straight edges, slide rules and logarithms as technologies. The arrival of digital mathematical tools has offered a new set of ways to understand how the mathematics we teach and learn is both shaped by—and shapes—the design and use of all tools. Examples through recent history reveal some of the innovative digital tools that have emerged, from dynamic geometry software to augmented reality. These tools will influence the ways that humans will engage with mathematics in the future. At the heart of Alison's work is a strong belief that well-designed technologies open the 'black box of mathematics' to make its learning an intriguing, fascinating and accessible subject for all.

However, there are currently problems with the take up of these tools in the classroom. Teachers are very busy, leaving little time for innovation in teaching methods. Most in-service training for teachers focuses on the national examinations and national priorities in schools such as safeguarding. Judgements on the schools are based on examination results and the current national assessments do not require skills in new technologies in mathematics. Because schools are currently facing cutbacks in funding, there is also a reluctance to buy new pieces of equipment that will require ongoing training and maintenance. The need for such equipment to improve understanding of mathematics has also not been accepted at government level. By contrast, in Norway digital skills and mathematics are now a part of the school curriculum—so maybe eventually things will change in the UK.

During the seminar, participants looked for themselves at a practical example that was then illustrated further on the computer. It was generally concluded that, although changes in approach to mathematics would be helpful, it is not immediately clear how—given current priorities—this might be delivered.

Seminar 5: Careers in and with Mathematics, 10 June 2019

The final seminar was a panel session with five speakers from different backgrounds in the pure and applied Mathematics world. Many young people, their parents and their teachers do not understand the wide range of careers that an interest in mathematics can lead to. Each speaker gave a short speech on their own mathematics career journey and how mathematics is viewed in their organisation. The subsequent discussion concentrated on the need for young people with mathematics talent and interest to explore the opportunities for careers in and with mathematics.



Dr Noel Ann Bradshaw is a senior data scientist and operational research for Sainsbury-Argos. Her career started in hospitality, but she became more interested in mathematics. After gaining her degree, she became a university lecturer and she now works in mathematical modelling for Sainsbury-Argos. Large supermarkets have a large amount of data on customer shopping habits which enables them to plan various aspects of their work including for example the variety of goods stocked at different shops and optimal pricing of goods.

Dr Helen Harth is now a senior policy adviser on education at the Royal Society. She is an education researcher and teacher specialising in mathematics education. Her predecessor, Dr Rosalind Mist, gave the first seminar in this series. Helen stressed the importance that the Royal Society places the basic underpinning role of Mathematics for many new technologies in the data age. The study of mathematics with another discipline, such as geography, can be an important basis for a career.



Avinash Nandal is a senior consulting actuary with Barnett Waddingham. Avinash studied actuarial science at City University. He now works for an actuarial consultancy, advising companies and institutions on their pensions scheme. The actuarial profession is a growing profession in the UK and worldwide. Actuaries are experts on risk management. They are problem solvers and strategic thinkers with a deep understanding of financial systems. They use their mathematical skills to measure the probability and risk of future events and to predict their financial impact on a business and its clients.

Dr Hugh Shanahan is a reader in computer science at Royal Holloway College. He originally worked in high energy physics, in which he gained his PhD. His main interests now are in bioinformatics. As a data scientist he analyses large data sets and draws inferences especially where some of the sub-sets of data may be biased.

Erica Tyson read engineering at university and worked in aerospace for Rolls Royce for a lot of her career. She started in the technical area and then moved into the human resources team for the company. In Rolls Royce, mathematicians are used across the business to look at areas such as engine noise, computer control of the aircraft, engine reliability and market analysis. She now works as University Liaison Officer for the Institute of Mathematics and its Applications. As part of that role she delivers talks on careers with mathematics at universities.

Conclusion

The seminar series was attended by Educators and their guests. We were pleased to welcome practising teachers and members of other livery companies. Good discussions of mathematics and its teaching were held each time. The engagement of young people in mathematics is a key issue and the series looked at various ways that this might be achieved. The supply of well-qualified mathematics teachers is another concern.

We could not solve the problems in mathematics and its teaching in the UK but it is hoped that the discussions encouraged more people to think about the various issues. We would like to thank Anglia Ruskin University London for making us so welcome and providing an opportunity for informal chatting as well as the more formal event. A thank you also to Liveryman Jon Pettigrew who coordinated the arrangements for each seminar.

Past Master Elisabeth Goodwin, Master 2018-19