The Joint Mathematical Council of the United Kingdom

A Charitable Incorporated Organisation
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Registered Office: De Morgan House, 57-58 Russell Square, London, WC1B 4HS

Minutes of the General Meeting held online at 11.00 am on Tuesday 8 June 2021

Present

Officers

Chair	Andy Noyes
Deputy Chair	Noel-Ann Bradshaw
Secretary	Chris Chipperton
Treasurer	Jennie Golding

Representatives of Participating Bodies

Adults Learning Mathematics	Beth Kelly
Association of Mathematics Education Teachers	Fiona Curtis
Association of Teachers of Mathematics	Hayden Rissbrook
British Society for Research into Learning Mathematics	Jeremy Hodgen
British Society for the History of Mathematics	June Barrow-Green
Edinburgh Mathematical Society	–
Heads of Departments of Mathematical Sciences	Jan van den Heuvel
Institute of Mathematics and its Applications	Paul Glaister
London Mathematical Society	Kevin Houston
The Mathematical Association	Tom Roper
Mathematics in Education and Industry	Charlie Stripp
National Association for Numeracy and Mathematics in Colleges	Graham Griffiths
National Association of Mathematics Advisors	–
National Numeracy	Paul Milner (deputy)
NRICH	Ems Lord
Operational Research Society	Evelyn Hardy
Royal Academy of Engineering	–
Royal Statistical Society	–
Scottish Mathematical Council	Carol Lyon
STEM Learning	–
United Kingdom Mathematics Trust	–
Wales Institute of Mathematical and Computational Sciences	Sofya Lyakhova

Co-opted Members

UK Representative to the International Commission on Mathematical Instruction	Chris Budd

Representatives of Observing Bodies

Department for Education [England]	Alex Smith
Department of Education [Northern Ireland]	Julie Harris
Education Scotland	–
National Centre for Excellence in the Teaching of Mathematics	Sue Madgwick
Office for Standards in Education	–
The Office of Qualifications and Examinations Regulation	Sarah Old
The Royal Society	Helen Harth
The Royal Society Advisory Committee on Mathematics Education	Anthony Tomei

Scottish Qualifications Authority –
Welsh Government Education Department –

1 Introduction

1.1 **Welcome** The Chair welcomed everyone present and opened the meeting.

1.2 **Practical Arrangements**

1.3 **Apologies for absence** Apologies for absence were received from: Andrew Wilson (EMS), Matt Lewis (NAMA), Sam Sims (National Numeracy), Steve Lyon (STEM Learning), Hannah Telfer (UKMT), Pamela Di Nardo (Education Scotland), Hannah Stoten (Ofsted), Sreve Wren (Ofsted), Sue Pope (SQA).

New members and deputies were welcomed to the meeting.

2 Minutes of the meeting held on 16 February and 17 March 2021

2.1 **Approval of the minutes of the meeting on Tuesday 16 February** All actions in the minutes were reported as complete. The minutes were approved.

2.2 **Approval of the minutes of the meeting on Wednesday 17 March** The minutes were approved.

2.3 **Matters arising not elsewhere on the agenda** There were no matters arising not appearing elsewhere on the agenda.

3 Reports from Trustees

3.1 **Chair** In addition to his written report, the Chair reported that the Trustees had discussed the pattern of future meetings. It was recommended that JMC aims to have two face-to face meetings in November, the AGM, and June, and that the February meeting remained online. With the exception of the September planning day, all Trustees meetings will be held online.

A number of points were raised including the possibility of hybrid meetings, concern that meetings do not become England-centric, and the value of informal conversations taking place around face-to-face meetings.

The recommendation was approved.

In relation to the proposal for a National Academy for Mathematical Sciences (NAMS), the Chair reported that he had met with David Abrahams and Celia Hoyles. The meeting had a more open-minded and optimistic feel than earlier communications. There was an opportunity to talk through concerns including the difficulties in representing a very diverse community.

A new green paper is being drafted which will include ‘education and engagement’. There is an opportunity to feed into the green paper and to engage with it once published.

The issue of NAMS is also relevant to RS ACME and the JMC-ACME relationship so there remains much to consider. While there is a potential threat to JMC there are also possible benefits. For example, there could be substantial resources available to support the kinds of activity and impact that JMC is working towards.

3.2 **Deputy Chair** The Deputy Chair spoke about her recent email concerning the intention to start having blogs linked from the new JMC website. Ideally, there would be one post per month and these could cover a range of topics, e.g. conference reports, items of ‘passion’. Two organisations have already signed up for September and October. The goal is to help raise the profile of JMC and its member organisations. Representatives will not necessarily have to author blogs as these can be from others within their organisations. It would be helpful if the Deputy Chair could receive contributions two weeks in advance. In response to a question, it was stated that there would be light touch editorial control with the objects of JMC being the guiding principle.

3.3 **Secretary** The written report was noted.

3.4 **Treasurer** The Treasurer thanked representatives for the prompt response to the request for subscription payments.

There had been an underspend for obvious reasons connected with the pandemic and the accounts were healthy. The proposed budget was cautious and based on a number of assumptions including subscriptions being maintained at the current level, there only being two face-to-face meetings, and £8,000 for project expenditure. There would be a slight reduction in the current account.

4 Reports from Committees

4.1 **ICME** Chris Budd reported that the re-scheduled ICME would be taking place in July as a hybrid event. Correspondence was taking place with award holders, IMA and LMS regarding bursary funding that was no longer needed for travel and accommodation. While some would still be needed for presentations the remainder will be returned to the IMA and LMS.

5 Elections

5.1 **Election of Chair** The Secretary reported that at the close of nominations, Professor Andy Noyes was the only nominee for Chair of the JMC and was elected unopposed. He will serve a second three-year term from the end of the AGM on 11 November 2021 until the end of the AGM in November 2024.

The Chair was thanked for all he had done during his current term and being prepared to continue. He received the congratulations of everyone on Council.

6 Reports from Participating Bodies

The Chair thanked representatives for submitting reports. From these the following points were highlighted:

6.8 IMA: The number of scholarship awards has increased.
6.9 LMS: The development of a scheme to help HE departments encourage their students towards teaching.
6.10 MA: The success in the level of participation in the online conference. This raises a question about the future balance of online and face-to-face activities.
6.11 MEI: What will be the impact on university courses of there having been no exams and unfinished courses? Universities are being encouraged to be in contact with their incoming students although this has difficulties attached. A discussion paper with proposals for the future is to be published soon.

7 Reports from Observing Bodies

There were no reports. The Chair is to explore the challenges and issues of OBs submitting reports with the OB representatives. **Action: Chair; Secretary**

8 Reports from Meetings

The were no reports.

9 Discussion of Reports

It was noted that a number of organisations are adapting to online conferences as a result of the pandemic.

Feedback from the MA conference indicated that it had been successful for a variety of reasons including, financial, health and family pressures. A hybrid model is being planned for next year.

The SMC conference attracted a record number of attendees, including educators from remote areas of Scotland and abroad. A hybrid model is being discussed and participants from the last two years' events are being surveyed.

ATM were used to a traditional multi-day model. Two styles are being proposed in coming years with a shorter face-to-face conference and a second online event. However, it is recognised that the online conference market is crowded.

Last year's ALM conference had been cancelled. However, all speakers had moved online through the year. The spanning of time zones is an issue given the membership.

10 Projects

A number of expressions of interest had been received for the work on *Mathematics education 5-14 and gender* and the work has been awarded. The response to the call for the *Mathematics education 14-18 and gender* had been limited and it had not been possible to award the work. The call is to be re-issued. A benefit of delaying the 14-18 project will be that it will be able to take account of the impact of changes to qualifications as a result of the pandemic.

There had been an interesting discussion amongst the Trustees regarding potential conflicts of interest when Trustees or members of Council submitted bids for JMC commissioned work. A more robust process has now been developed.

11 Meet the Council

British Society for Research into Learning Mathematics (BSRLM)

BSRLM is a society concerned with mathematics education research across the United Kingdom. The society is about 40 years old with approximately 300 active members. The membership is more focussed on mathematics education itself and less on the psychology of mathematics education. BSRLM has relationships with sister organisations across Europe including Norway, France and Ireland.

Three one-day conferences are organised each year. The conferences are virtual at the moment which has led to greater participation with about 150 attendees; this equates to the number of attendees at London conferences. Conferences are organised in all four jurisdictions with attracted from across the globe. The virtual conferences have been liked but it is questioned whether they are less successful in enabling collaboration.

A day for new researchers is held and presented in a friendly, supportive environment. There is also a day for practitioner researchers and teachers.

The BSRLM journal is 20 years old although it has only been a true journal for 12 years. The journal is international, successful and continues to grow. A review of research is published periodically (every 10 to 15 years).

The Institute of Mathematics and its Applications (IMA)

The IMA is a learned society with close to 6,000 members. It was formed in 1964 and received its Royal Charter 1990. There are several categories of membership (Affiliate, Student, Associate, Member, Fellow) and chartered status. 18 staff support an Executive Board, Council and committees which include HE, and Schools and FE. A number of volunteer roles include President, Vice-Presidents, Honorary Secretaries and Council members/trustees.

The IMA has regional branches, accredits HE mathematics courses and has grants schemes including education grants. It is involved in Teaching and Learning Mathematics Online (TALMO) and the STEM ambassador scheme. It administers the Mathematics Teacher Training Scholarship scheme and hosts the Maths Careers website for all 11 plus students. The IMA has 8 journals including Mathematics Today.

There are a number of awards and medals including the Christopher Zeeman and David Crighton Medals both of which are in conjunction with the LMS. It works with other learned societies on the Council for Mathematical Sciences (CMS) and with the Royal Society through ACME and is engaged in the Mathematics Futures programme.

12 Maths Week England

Andrew Jeffrey joined the meeting for this item.

MWE 2020 had reached two-thirds of a million students. Successful features from 2019 had been retained with the event being largely online. Particularly liked had been puzzles, problems and free resources sorted by key stage. MWE 2020 had been strengthened with a management committee.

2020 had seen a new page every day and videos had been included. Year group quizzes had proved most popular along with puzzles. It had inspired the development of ‘something we devised ourselves’.

With more planning there should be more notice of MWE 2021. There will again be a focus on it being online with more no-print resources. It is hoped that prizes will be available. Planning is going well. Funding is being sought with offers at different levels of partnership (gold, silver, bronze). The main cost is the website followed by the human cost and time.

To improve reach, help with social media would be useful. Consideration also needs to be given to live events for students to attend. Andrew Jeffrey would always welcome any thoughts on ways to develop MWE.

There will be an update in the autumn term for JMC to circulate.

13 Any other business not elsewhere on the agenda

The Chair had been contacted by representatives of MMSA and BSRLM following the publication of Ofsted’s Research review series: mathematics. It was agreed that an additional meeting should be arranged. Representatives from MMSA, BSRLM and the Trustees would be invited, but anyone else wishing to be part of the conversation should contact the Secretary. **Action: Chair; Secretary**

14 Discussion: The Use of Digital Technology in Mathematics Education

The Chair introduced the discussion item. The use of digital technologies in mathematics education is a challenging space that has been further complicated by how digital technology has developed and been used during the pandemic.

A joint JMC ACME workshop had been held and had tried to frame the space; notes from the meeting had been shared with the agenda and papers. It is hoped that videos of the three short presentations in the workshop will be shared via the JMC website.

Picking up from JMC 2011 report, it is intended to establish a working group to develop a report from within JMC rather than to outsource a project. For the current JMC, this will be a new way of working and we need to frame the process.

Sofya Lyakhova and Jennie Golding gave a short presentation which drew out points from their discussion paper circulated with the agenda. Council went into breakout rooms to consider:

1. Are there key areas of digital tool use for school mathematical purposes that are not included in the paper?
2. Is the range of uses of digital tools about right? If not, why not? Are there valued purposes for digital tools which have not been identified?
3. Which areas of mathematics learning, at which stages, could be enriched through the use of digital tools?
4. Referring to the JMC 2011 report 'Digital technologies and mathematics education', to what extent are the recommendations still valid and/or needed, in each home nation?
5. What evidence is there about the impediments to wider use of digital tools for school mathematics in each of the four UK nations?

The following feedback emerged:

Group 1

- Concerns about why recommendations not implemented and what happens now.
- Digital education is a future and should be important – in particular: as a tool for exploration.
- Concerns about whether funding is available for resources and teaching.
- Rep of Ireland require teachers to use GeoGebra.
- Concerns from some that primary education does not appropriately develop digital skills.
- A report could look at models elsewhere in the world.
- What is the view around 'basics'? Politics matters – particularly at primary.
- Possibly change at higher level and leave concerns about KS1 to later.
- Focus on the future workforce.

Group 2

Q5 – teacher conservatism 'supported'/unchallenged by inundated curriculum. Teachers need safe and secure environment to experiment with technology. PD is the key. Large data sets were implemented but not as intended. Ofqual had mixed reports from teachers about spreadsheets use in classroom. Ofqual is taking part in a research project about AI-assisted assessment. To date technology is largely not used for assessment. One example of technology embedded into assessment is Further Pure with Technology module which cannot be completed or assessed without learners using technology. Introduce similar initiatives at A-level Maths or GCSE maths. In MEI maths technology experts anecdotally reported that using and developing technological applications changed how they feel/do/think mathematics.
Q3. – Politicians being sceptical about technology being damaging at early stages (primary). Topics, areas or aspects that could benefit from the use of technology: visualizing mathematical ideas, graphs, geometry, maths learning could be enriched generally.

Group 3

re Jennie and Sofya's paper:
The group felt all the key areas had been covered.

The group acknowledged that the paper covered a good range of technology but that this was currently not being fully utilised in either England or Scotland.

Issues mentioned included:

- Teacher confidence;
- Teachers grappling with new ways of teaching;
- Sometimes, when technology was used it wasn't used effectively as teachers were using it as they would ordinary tools without looking at new pedagogy;
- Although calculators are used earlier in Scotland, they are not allowed to be used early enough in England;
- Graduates coming into teacher training courses often had little/no experience of using digital tools;
- Teacher training courses do not emphasise digital tools enough;
- Currently there is little incentive for teachers to use these technologies;
- Systems need changing to enable it to be incorporated into the curriculum;
- Precious computer lab space is often taken by students doing Computer Science;
- Digital technologies enhance students' understanding of real-life problems such as pandemic and climate modelling.

The use of Python was discussed and noted:

- This is the ideal language/medium for exploring large data sets;
- If it was introduced prior to A-level then it could be utilised for data exploration at A-level;
- It is excellent for any form of statistical analysis that is needed to make predictions;
- It was questioned where Python could be used (Chris said everywhere).

Additional note: You can obviously do very basic calculations using Python so you really can use it to teach coding and graphing that solves any maths problem. It can be a really good way to get students to think through the individual stages of a problem and also visualise them.

Progress with previous recommendations:

- These are still as valid today as 10 years ago and little progress has been made. We might even have gone backwards.
- We discussed this and noted issues such as lack of encouragement from government and the complexity of making this work.
- Is there a need for legislating re use of digital technologies in order for them to become the norm?

Group 4

- Facilitating collaborative working would be very beneficial. More tools allowing this are expected next year. The ability to combine face-to-face with webinars is being developed.
- While it would be welcomed by some groups, a list of tools is dangerously like giving recommendations and can quickly become out of date.
- Re Q2, the term 'valued' is problematic. There is no agreement or shared sense.
- While there is an attraction to a curation of 'trusted sites' we do not know how to do this.
- It should be recognised that some software is difficult to use.
- There is some criticism of some well used sites, e.g. Hegarty Maths. Consideration should be given as to how these popular resources can be used well.
- Professional development for teachers has a crucial part to play.
- The use of digital tools should be developed alongside deep understanding of the mathematics.
- Areas of misconception need to be identified and worked on.
- Calculators are useful – why hasn't the argument been won?
- Ideas of programming should be included; this would support post-18 education.

A suggested model for the working group was put forward:

- **Timescale**: to be convened from July 2021, publishing their report in spring 2022.

- **Contributors**: 6-10 WG members, including expertise with digital technologies in mathematics education for ages 5-18, teacher development for teaching mathematics with digital tools, mathematics curriculum, assessment, pedagogy in the UK, and related policy change. To include both 'enthusiasts' and 'pragmatists'.
- **Mode of working**: meeting largely remotely, but could also meet face to face.
- **Audiences**: to produce outputs for various groups: JMC, teachers of mathematics, CPD leaders, policymakers
- **Budget**: around £8k

With possible outcomes:

- An evidence synthesis of where digital tools can support 5-18 mathematics learning
- Short case studies from across the four nations illustrating the potential of digital tools in 5-18 mathematics education
- A classification of digital technologies in aged 5-18 mathematics education.
- Pointers to effective approaches used in other international jurisdictions
- A high-level vision for digitally-enhanced mathematics education for the four home nations, proposed next steps and associated risks and opportunities
- A theory of change model

Breakout groups considered these suggestions and provided the following feedback:

Group 4

- The timescale could be very tight especially if case studies are to be included.
- There is a danger that a report could be produced that appears self-evident with everybody simply being in agreement. It needs to have a chance to actually move things forward.
- What do we want to achieve? Can we start with this and work backwards?
- This really needs to be linked to a change in the curriculum, but it is recognised that this is too much.
- Should/could teachers be surveyed to ascertain what they are using/doing and what are the issues for them.
- What is the impact on other subjects?
- Infrastructure is an issue to be taken into account.
- Professional development is a key issue.
- Where are there successful examples? Nordic countries; prison service including in America; New Zealand – the use of calculators is moving forward.

Group 3

Composition:

- Some sceptics – those close to classroom practice who see the impediments in implementing the use of digital tech;
- At least one practicing maths teacher who is doing this well in a state school;
- Someone who knows this area of literature in relation to maths education;
- People representing all countries in UK;
- People with cross-phase expertise;
- Someone who knows where this is going in terms of future use of technology in the workplace and the scope of machine learning and coding.

Timing:

- Is the proposed time frame long enough?
- Could the funds be used to employ someone to do the legwork?

Additional note: As well as case studies I wonder if we could get those who are doing this well to make short videos of what they are doing and host them on the website as a resource for teachers?

Group 2

The group remarked about similar initiatives appearing from time to time but leaving no impact. However, there was a strong view that the community should continue trying, so the JMC proposal is welcome and should go ahead.

Specific areas to cover in case studies: better understanding of statistics, exponential growth, technology and use of manipulatives at KS2, a case study about the use of technology illustrating connections in mathematics (depth of mathematical understanding), Tom Button case study – how working with technology changes one's thinking about mathematics.

The WG should think about teacher PD and upskilling teachers, not just the high-level vision but also a practical vision about how to make it happen.

There is no body responsible for the curriculum development, exam regulators are responsible for assessment only. Should there be one?

Group 1

- Concerns of being overambitious / unfeasible
- Is now the time? Might go out of date quickly being on the tail of the pandemic.
- Case studies might work but it depends on what they are for – to support professionals or to suggest alternative futures
- Categorisation might well be enough for now

15 Conclusion

The Chair thanked everyone present for their contributions and closed the meeting.

16 Dates of future meetings

Thursday 11 November 2021, venue tba (deadline for papers: Thursday 28 October 2021)

February 2022, online, date tba

June 2022, date and venue tba