

The Joint Mathematical Council of the United Kingdom

A Charitable Incorporated Organisation

Registered with the Charity Commission for England and Wales, Registered Charity Number: 1171223

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

Minutes of the AGM and General Meeting held online at 10.00 a.m. on Thursday 12 November 2020

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

Heather Davis

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

Matt Lewis

National Numeracy

Sam Sims

NRICH

Ems Lord

Operational Research Society

Evelyn Hardy

Royal Academy of Engineering

–

Royal Statistical Society

–

Scottish Mathematical Council

–

STEM Learning

Steve Lyon

United Kingdom Mathematics Trust

Hannah Telfer

Wales Institute of Mathematical and Computational Sciences

Sofya Lyakhova

Co-opted Members

UK Representative to the

International Commission on Mathematical Instruction

–

Representatives of Observing Bodies

Department for Education [England]

Alex Smith; Christopher Wheeler

Department of Education [Northern Ireland]

Julie Harris

Education Scotland

Pamela Di Nardo

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

Lynne McClure

Scottish Qualifications Authority

Sue Pope

Welsh Government Education Department

Alison Thom

1 Introduction

1.1 **Welcome** The Chair welcomed everyone present and especially those new to the JMC.

1.2 Practical Arrangements

1.3 **Apologies for absence** Apologies for absence were received from: Jeff Evans (ALM), Sue Gifford (BSRLM), Kevin Houston (LMS), Charlie Stripp (MEI), Carol Lyon (SMC), Alex Smith (DfE), Emma Gregory (Ofsted), Sarah Old (Ofqual), and John Mason (Welsh Government Education Directorate).

2 Annual business

2.1 The Annual Report was approved unanimously (Proposed: Secretary; Seconded: Jan van den Heuvel).

2.2 Jennie Golding presented the Annual Accounts. These were unchanged from the draft that had been presented at the previous meeting. Having not been able to hold face-to-face meetings there had been a reduction in expenditure and given a healthy carry forward into the budget.

The Annual Accounts were approved unanimously (Proposed: Heather Davis; Seconded: Kevin Houston)

2.3 The budget was approved as presented unanimously (Proposed: Heather Davis; Seconded: Kevin Houston)

2.4 Approval was given to subscriptions for 2020-2021 being held at the same level as 2019-2020 (Proposed: Heather Davis; Seconded: Kevin Houston).

2.5 It was noted that Noel-Ann Bradshaw had been elected Deputy Chair to serve from the end of the annual business until the end of the AGM in November 2023.

2.6 It was noted that Jennie Golding had been re-elected Treasurer to serve from the end of the annual business until the end of the AGM in November 2023.

2.7 The Secretary explained that the Trustees had considered the vacancies for Co-opted Trustees. Given their contribution and involvement over the preceding year, the Trustees proposed that Sofya Lyakhova and Kevin Houston be re-appointed for the roles to serve until the end of the AGM in November 2021. This was approved unanimously.

2.8 The Secretary proposed that Chris Budd (UK Representative to the International Commission on Mathematics Instruction) be co-opted as a Co-opted Member to serve until the end of the AGM in November 2021. This was approved unanimously.

3 Minutes of the meeting held on Tuesday 2 June 2020

3.1 **Approval** The minutes of the meeting held on Tuesday 2 June 2020 were approved unanimously.

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

4 Reports from Trustees

4.1 **Chair** The Chair stated that the move to virtual meetings of the Trustees had led to an increase in the number of times they had met and a very busy, productive period.

Attention was drawn to the joint JMC/RS ACME survey of mathematics teachers regarding the impact of Covid-19 on teaching and learning. There has been a very positive initial response, but representatives are encouraged to promote engagement in the survey. **Action: All**

4.3 **Secretary** The Secretary echoed the Chair's comments regarding the amount of activity that the Trustees had been involved in and expressed his thanks for their on-going efforts. He also emphasised his thanks to the Chair and Treasurer for their support and commitment.

The Secretary drew attention to the fact that Maths Week England 2020 was currently taking place and had got off to a very successful start.

4.4 **Treasurer** The Treasurer had covered all points within 2.2, 2.3 and 2.4.

4.5 **Constitution** In order to allow future annual general and general meetings to be held virtually, the Secretary proposed a resolution that the constitution be amended with a new section 11.10:

11.10 Participation in meetings by electronic means

11.10.1 A meeting may be held by suitable electronic means agreed by the charity trustees in which each participant may communicate with all other participants.

11.10.2 Any members participating at a meeting by suitable electronic means agreed by the charity trustees in which any participant or participants may communicate with all the other participants shall qualify as being present at the meeting.

11.10.3 Meetings held by electronic means must comply with the rules for meetings contained in this constitution or any Bye laws, including chairing and the taking of minutes.

The resolution was approved unanimously. **Action: Secretary**

4.6 **Bye laws** The amendment of 0.1 to 'These bye laws shall be reviewed before the end of each calendar year' was approved. **Action: Secretary**

4.7 **Policies** That there were no changes necessary was noted.

5 Reports from Committees

5.1 **ICME-14 Bursaries Committee** The Secretary referred to an update from Chris Budd:

'In February we awarded 10 bursaries totalling £4600 thanks to support from the LMS and the IMA. Clearly with the cancellation of ICME in 2020 the bursaries were not needed this year. It has been announced (on 29th Oct) that in 2021 ICME-14 will be held as a hybrid meeting (a mix of face to face and online).

I have written to all of the awardees to ask them what their plans are for 2021 giving them the option of either using all or some the bursary for the purpose intended in 2021 (which could include travelling to Shanghai if that is possible, or of producing an online presentation of a very high quality) or of returning it. I am in the process of gathering replies and will keep you updated.'

5.2 **MMSA** The report was noted.

Partly in response to the issue of SKE funding referred to in the AMET report, the Chair stated that a letter had been drafted by MMSA. He had approved the letter and it had been sent.

6 Reports from Participating Bodies

The Chair thanked those representative who had submitted reports which gave a good overview of the activities the community was engaged in.

The reports were noted, plus:

6.14 **National Numeracy** Sam Sims reported that in response to the pandemic, work had been undertaken relating to number confidence including managing finance. Although a trial this had proved to be successful.

A National Numeracy Day had taken place. This had included a double page spread in the Financial Times and the involvement of Jessica Ennis-Hill and Bobby Seagull, both of whom are numeracy ambassadors.

It was suggested that consideration be given to linking National Numeracy Day with Maths Week England.

7 Reports from Observing Bodies

The reports were noted.

8 Reports of Meetings

There were no reports.

9 Discussion of Reports

Mathematics Futures programme Helen Harth reported that the Mathematics Futures programme had been started by RS ACME in February 2020; Mathematics has a broad definition. Since the launch 3 workstreams had been developed: looking at the changing nature of Mathematics through a call for views; identification of foresight planning; mapping national mathematics education policy and international influences through a 20-year review with 8 broad themes. Responses to the call for views were encouraged and telephone calls welcomed.

ACME There had been a very constructive meeting. A major focus is educational technology and the impact of current practice

Subject Knowledge Enhancement The Government has not made a decision on SKEs and there is no commitment on a date for this. Difficulty in recruiting is causing problems. There is potential impact on diversity, etc.

10 Any other business not elsewhere on the agenda

10.1 **Issues around COVID-19:** A discussion took place around issues arising from the pandemic; these included:

- Scotland were viewing next summer as very challenging. Some early announcements were being made. Alternative arrangements are being put in place for National 5. Contingencies are being put in place for Highers and Advanced Highers.
- Information from CfSA indicates that NATE (subject association for English) had placed a statement on their website that formal assessments were not wanted for summer 2021.
- At least one subject association has stated the belief that core subjects will be treated differently in Summer 2021.
- Teachers need to be supported/developed with what they are doing and not have new things introduced.
- There is a danger of game playing by some schools.

10.2 **JMC report *Additional mathematics papers for entry to English universities: Their role, purpose and impact*:** The report has now been published. Due to concerns expressed by the Council, the work was commissioned by JMC in order to get more detailed evidence and the perspectives of academics, teachers and students. There had been some impact on the work due to the pandemic. Feedback was welcomed. The report is for JMC and it is for the Council to decide what next steps might be taken.

Jan van den Heuvel stated that the report was really useful and gave food for thought. He questioned the position regarding distribution. It was agreed that the report would be made available for HoDoMS as soon as possible. **Action: Secretary**

Paul Glaister commented that the report was a very good piece of work and very timely given all the current disruption.

The Chair is to make the DfE aware of the report.

10.3 **Introductions by some Participating Bodies**

The Association of Mathematics Education Teachers (AMET): With about 50 members, AMET is an association for teacher educators across the UK training the next generation of teachers, both primary and secondary. Some CPD is delivered and in recent years joint conferences have been held with NAMA; of late there has been a strong interest in webinars. The association is also available for advice. There is some reach into school-based training but this is limited and membership is largely HEI based. Membership is relatively low but there is a larger number of contacts.

The Association of Teachers of Mathematics (ATM): Originally formed as a split from the MA, the ATM seeks to meet the needs of teachers in the classroom from early years to post-16. The association has approximately 2,000 members of various categories as well as 1,000 student members who pay no fee. There is a small office staff of 4 (down from 6). An annual conference is held and there are branch meetings. Publications include books and the journal, *Mathematics Teaching (MT)*. Also available are *Mathematical Snacks* which are easy to reach short videos. Many resources are (currently) free.

ATM works with MA, who have a similar landscape, AMET, NANAMIC and within the MMSA. Talks about possible amalgamation which would maximise resources and strengthen the ability to promote through one voice are ongoing.

The Mathematical Association (MA): Celebrating 150 years in 2021 the MA has been engaged in mathematical reform. It has about 2,000 members some of whom will also be members of ATM (c. 20-30%). MA activities are similar to those of ATM and, particularly at local level, many take place jointly. A number of journals with various foci are produced, these include *Mathematics in School (MIS)* and *The Mathematical Gazette*.

11 Discussion: Mathematics Education and Gender

The discussion was introduced by the Chair and Alex Smith (DfE) which was followed by three short presentations from different perspectives. Following these, Council split into groups in four breakout rooms before reconvening for feedback.

Chair: The issue of gender in mathematics education is long-standing (e.g. research of Leone Burton's research and Heather Mendick's) with national data showing ongoing differences in participation. He noted his own research including how relative attainment at GCSE influences post-16 choices, and the impact of losing AS mathematics on girls' level 3 maths participation.

Alex Smith (DfE): The DfE are interested in increasing participation generally and especially in relation to girls. While it is understood that there are many barriers there is less known about how to overcome these; issues include confidence, the perception of the subject (when does this change?), coursework, lack of encouragement by parents/carers, (and the impact on self-confidence), potential career paths – 'where can Mathematics take you?', and the place of enrichment activities.

Sue Pope (SQA) – a Scottish perspective

The Council were reminded that school education in Scotland is organised in primary (P1-P7) and secondary (S1-S6) phases; S4-S6 form the senior phase during which qualifications are taken. There are 3 sets of national graded qualifications: National 5s at the end of S4 in both Mathematics and Application of Mathematics, Highers at the end of S5, and Advanced Highers at the end of S6. External assessment plays a small part. There has been a rapid uptake in N5 Applications of Mathematics – also in anticipation of a new Higher in Applications of Mathematics. Double entry has increasing numbers.

There is good participation in Mathematics in Scotland although there is a desire for more. Mathematics is the most popular Advanced Higher. While close, there are more females at National 5 but more males at Higher; there are significantly more males at Advanced Higher (Mathematics of Mechanics). Results have been stable until 2020 when there was a move to teacher assessment.

Rachel Beddoes (Girls' Participation Coordinator MEI AMSP)

It is recognised that there are not as many girls studying Mathematics as there are boys. Research and literature reviews underpin the AMSP's efforts to counter this.

There are five key factors: prior attainment; enjoyment; perceived competence; interest in mathematics; utility of mathematics.

- Prior attainment is the number one factor. Attainment relative to that in other subjects is important and can work against all-rounders especially when Mathematics isn't the highest.
- Enjoyment is a more influential factor for girls than boys.
- Self-concept is lower in girls but advice and encouragement can mitigate against this.
- Interest is similarly less for girls and interventions should start early to address this.
- Communicating the utility of mathematics is of vital importance for girls.

Key influences:

- AMSP provides enrichment, resources for teachers and students, and professional development.
- Speed networking.
- Panel Q and As.
- Female presenters/speakers.
- Equal numbers of genders participating in events.
- Specific events for females.
- Engagement with teachers in networking.
- Considered use of images and language.

Work with employers and universities is important.

There are also others in STEM education working on gender issues: STEM Ambassadors working directly with school; IOP run campaigns, whole school gender programmes, and target influencers and communities; Tomorrow's Engineers consolidating offers.

Core Maths has an increasing percentage of girls and the gender gap is closing.

'Hot off the press' from the Welsh Government: Girls and boys learn differently; role models are liked; real-life project-based learning is effective.

Ems Lord (NRICH)

In addition to being Director of NRICH, Ems is a Research Fellow at Clare Hall, Cambridge undertaking research into mathematics education, focusing on ways to improve student outcomes, address the gender imbalance in mathematics study post-16 and widen participation in mathematics.

Work done 10-15 years ago with primary age pupils saw girls deemed to be doing well at KS1 and good projections for the end of KS2 going from working above expectation to working below. Classroom observations saw teaching being largely carried out by keen, enthusiastic non-specialists. The 'top table' tended to be boys with 'close by' tables tending to be girls. Girls were not participating and were 'elected mutes'. Unlike in English, there was no practising of dialogue. In Hungary, problem solving uses quiet discussion leading to individuals making notes, talking and finding a solution. Pupils are then able to offer more confident feedback as they knew what they were going to say.

National performance data shows similar percentages of girls and boys at L4, but at L5 there is a gender gap. The L4 curriculum focuses on procedures and calculation methods while for L5 problem solving and communicating thinking are evident.

Calculation, which dominates the primary curriculum, is biased towards girls reflecting how they want to work and with opportunity for lots of positive feedback. When there is a change to problem solving girls are less flexible and unable to stick with known methods.

The STEP support programme, which is not specifically for girls, takes place from Easter/April which is too late to build confidence. The programme needs to change

More students are taking A level Mathematics, which is good, but there are not necessarily more girls. The number of girls studying the subject at university are not increasing. At a school with a strong Mathematics department, it was asked why there were not more girls from a wanting to study the subject at university. The response was that the girls wanted to do 'caring jobs' and that Mathematics was not seen as leading to a career that can do this. How Mathematics can help others is an important intrinsic theme that needs to be developed.

Feedback (Notetaker/Secretary)

Group 1:

Do girls know enough about career opportunities?

Perception of mathematicians in the media.

Content – what appeals to girls?

Why are other subjects able to attract girls?

Group 2: Our group discussed two options for research:

- An investigation into perceptions of mathematics learning being for everyone (colour, gender, ethnicity, religion being irrelevant). Such as, for example, when maths classrooms are equipped with appropriate posters and attitudes measured before and after posters are put in place.
- Literature review of differences in male and female learners' perceptions of assessment. Are some forms of assessment more attractive for girls?

Portal for relevant research.

Coursework and assessment – how these impacts on girls.

How society influences attitude.

Image of mathematicians – poster set of a range of mathematicians.

International experiences e.g., in Italy many mathematicians are female.

Group 3: We spent nearly all of the time talking about confidence with mathematics and the lack of it in too many critical places

The conversation broadened to the general issue that girls assume they can't do something whereas boys assume they can, and girls underestimate their ability to complete a task successfully and boys overestimate their ability to complete a task successfully.

The issues that face girls doing mathematics are part of a broader issue. However, our brief is mathematics.

Although the issue of lack of confidence with mathematics and willingness to choose it post-16 to the same extent as boys manifests itself in KS4 and KS5, the roots of it are much earlier.

Research shows general lack of confidence in girls starts at approximately age 8. Again, the roots are likely to be much earlier.

A possible question to research could be about what effect the lack of confidence in primary teachers has on the confidence of the children in their classes, particularly girls, who are more inclined to try to fit in (again many questions are raised by that too but not mathematical ones).

I suspect there is a similar issue in secondary around teacher confidence, particularly with less experienced teachers and non-specialists with higher prior attaining groups but we didn't talk about that and the damage is largely done by then.

Jenni mentioned interventions used in a research project that, to paraphrase, nudged girls when they hesitated or seemed to lack confidence. The 'maths whisper (?) project' reminded them that they could do it. In terms of a small but focused intervention that seems to 'have legs'. Another aspect was to enable learners to see that mathematics is used in so many places in work and life and so is relevant.

Confidence.

Assumption by girls that they can't (by boys that they can).

Decisions re post-16 and HE.

When and why it changes?

Primary school teachers are massive influencers – Approach and attitude to maths? Pedagogical approach?

Real-life – make it relevant.

Group 4:

Objective

- The group started with someone asking if the gender gap was important and suggesting that maybe there was good reason why girls were not as good at maths as boys.
- It was pointed out that we needed to know why we wanted to do research around this. What are we trying to achieve i.e., more people doing maths degrees, just closing the gender gap, more people doing numerate degrees?

Factors affecting A-level choice

- Do girls know where maths can take them and how important are their families in them making choices re A-level/degree?
- Could we ask sixth-formers/their families what expectations they have for future study/work and what they think the barriers are?
- Do girls understand that A-level maths is important for a wide range of jobs as it has other benefits like the ability to think mathematically?
- We noted that the Scottish initiative is aimed at parents of primary school children.

Mathematics curriculum

- Is it just that there are other subjects more attractive to girls?
- Girls seem to have more choices than boys.
- A-level can appear abstract – do girls understand what pure and applied maths is?
- You can specialise in science but not in maths – is this an issue. Girls used to like decision maths, has the loss of this led to fewer girls taking maths further?

Other questions that were posed

- How can we attract more role models for girls?
- What can we do to attract high attaining girls to continue with maths?

Need to work with parents/carers – where can maths go re careers.

Close the gap; increase numbers – maths or numerate subject.

Why don't high attaining girls continue?

Are other subjects just more attractive?

Unified nature of maths.

Remainder not in breakout rooms: *Impact of language and underpinning curriculum.*

12 Conclusion

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

13 Dates of future meetings

Tuesday 16 February 2021 National Council for Voluntary Organisations booked but likely to be online (deadline for papers: Tuesday 2 February 2021)

Tuesday 8 June 2021, venue tba (deadline for papers: Tuesday 25 May 2021)

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

These meetings will begin at 11.00am