

# 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 Thursday 24 February 2022

### 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

Andrew Wilson

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

Paul Milner (deputy)

NRICH

Ems Lord

Operational Research Society

Evelyn Hardy

Royal Academy of Engineering

Rhys Morgan

Royal Statistical Society

Jonathan Everett

Scottish Mathematical Council

Carol Lyon

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

Chris Budd

#### *Representatives of Observing Bodies*

Department for Education [England]

Alex Smith

Department of Education [Northern Ireland]

Julie Harris

Education Scotland

John Neeson (deputy)

National Centre for Excellence in the Teaching of Mathematics

Sue Madgwick

Office for Standards in Education

Hannah Stoten/Steve Wren

The Office of Qualifications and Examinations Regulation

Sarah Old

The Royal Society

Catherine Boulton

The Royal Society Advisory Committee on Mathematics Education

Anthony Tomei

## 1 Introduction

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

The Chair thanked those representatives who had submitted reports. However, it was evident that these were smaller in number than usual. All Participating Bodies were encouraged to submit one as they helped the Council and the community gain a valuable insight of what is happening in the community.

Shorter items for discussion can be raised away from reports as well as within them. Such items can be included in the agenda for the morning session.

- 1.2 **Practical Arrangements** As with the November meeting, representatives from Observing Bodies were to be invited to give verbal reports which would not be minuted.

- 1.3 **Apologies for absence** Apologies for absence were received from: Sam Sims (National Numeracy), Pamela Di Nardo (Education Scotland); Sofya Lyakhova (WICMS)

New members and deputies were welcomed to the meeting.

## 2 Minutes of the meeting held on 11 November 2021

- 2.1 **Approval of the minutes of the meeting on Thursday 11 November** The minutes were approved.

Re. Item 9.2 – The action had been carried out and the Digital Technology and Mathematics Education Working Party formed (see 10.1).

Re. Item 13 – The summary produced by the Chair was agreed to be appropriate.

- 2.2 **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** The Chair's report was noted.

Although a later agenda item, particular attention was drawn to the proposal for a National Academy for Mathematical Sciences (NAMS). With the Green Paper and Town Hall Meeting, there had been an interesting process and there was still much thinking to be done. The Chair had reported that he had been invited to join the Task and Finish Group which was due to meet the following week.

The Chair also reported that he had met with colleagues from Ofsted. The forthcoming Subject Review had been discussed and the possibility of the Chair brokering involvement of Council in some way.

- 3.2 **Deputy Chair** The Deputy Chair informed Council that the Trustees were continuing to look to improve communication through social media. To aid this, a call for expressions of interest in the role of Social Media Lead had been drafted and would be circulated following the meeting. Council was asked to do all they could to publicise the call and to bring it to the attention of any individuals for whom it may be of interest. **Action: Secretary; All**

- 3.3 **Secretary** The Secretary's report was noted.

In respect of the impending call for nominations for Secretary, it was questioned whether the current incumbent was eligible to stand again and, if so, was he willing to be nominated. The Secretary confirmed that he is eligible to be nominated for a second term and is willing to be nominated.

- 3.4 **Treasurer** The Treasurer's report was noted.

The Treasurer further reported that reminders had been sent to the small number of organisations whose subscriptions were outstanding.

The underspend shown in the accounts was clarified as being due to the pandemic continuing which had prevented the planned face-to-face meetings; there was still some outstanding spend on projects. As a result, the treasurer is confident about the level of subscriptions going forward.

## 4 Reports from Committees

- 4.2 **MMSA** The report was noted.

The name for an amalgamated organisation was questioned. In response, it was stated that a great many permutations had been tried and the Association for Mathematics in Education had been the proposal with the greatest consensus.

## **5 Reports from Participating Bodies**

The reports were noted.

## **6 Reports from Observing Bodies**

Oral reports were received. In line with Council practice minutes of were not taken.

## **7 Reports from Meetings**

The were no reports.

## **8 Discussion of Reports**

## **9 National Academy for Mathematical Sciences**

The Chair outlined the recent history of the proposal for the formation of a National Academy for Mathematical Sciences (NAMS) which was initially proposed in the Bond Review. This included the publication of a Green Paper and a Town Hall Meeting which had been followed by an Extraordinary General Meeting of JMC after which a response to the consultation had been finalised and circulated.

The general view taken by Trustees is that JMC should be 'round the table' in as constructive way as possible.

NAMS would seek to provide a single, unified voice for the mathematical sciences community much as JMC once did for mathematics education.

The latest proposal has brought in education as one of five functions: Policy Affairs, ED&I Affairs, Practitioner Affairs, Educational Affairs, and Academic Affairs.

## **10 Projects**

### **10.1 Digital Technology and Mathematics Education Working Group**

### **10.2 Mathematics Education 5-14 and Gender**

### **10.3 Mathematics Education 14-18 and Gender**

## **11 Meet the Council**

### **Mathematics in Education and Industry (MEI)**

MEI is an independent charity with three core aims: to raise the quality of maths education; to improve social equity through access to high-quality maths education; to promote the relevance of maths education to everyone – in the workplace, in everyday life, and for active citizenship.

Through its involvement in NCETM and the forty Maths Hubs, and AMSP, MEI has good reach.

It has about 70 staff and employs maths education experts with extensive classroom experience from primary through to post-16 and Further Mathematics.

MEI works to develop the mathematics curriculum including acting behind the scenes and responding to consultations, teacher development, and the development of resources. It plays a leading role in national programmes (AMSP, NCETM).

With strong mathematical values, MEI promotes the appreciation of both the beauty and utility of the subject, and that mathematics is a logically connected whole. It also promotes mathematical thinking, relevant uses and applications, and collaborative working.

Current projects and programmes include AMSP, NCETM, data science, the Mathematics Excellence Partnership in Stoke-on-Trent, and supporting students to achieve A\* at A level (with Imperial College). MEI has concerns about the position of resits for students not achieving a minimum of grade 4 in GCSE mathematics.

It was asked whether MEI talked to and/or collaborated with other subject areas. In response, it was stated that Core Maths had links with geography, psychology, social sciences and biology. Additionally, the reformed A levels have more maths content for a number of subjects. MEI is keen to promote and strengthen connections.

## 12 Any other business not elsewhere on the agenda

### Consideration of the Education and Training Foundation (ETF) as an Observing Body

A proposal was put to the Council that ETF became an Observing Body. ETF supports teachers and teaching in FE and has a lead for mathematics.

Questions arose concerning the process and to what extent organisations apply or are invited to become members of Council.

It was agreed that the process for gaining membership be looked into **Action: Chair; Trustees** and that a more formal, written proposal for ETF's membership be presented at the June meeting. **Action: Graham Griffiths**

## 13 Discussion: The Mathematics Education Pipeline

### HEI (Cathy Hobbs, UWE Bristol) and Charlie Ball (JISC)

Analysis of intake to mathematical science degrees in the UK over the last ten years appears to be static at around 8,500. However, this masks some significant variations and there looks to be a problem with entry to undergraduate mathematical sciences degrees. While there has been a Covid effect, issues have existed prior to this.

Intake was considered by tariff group (high, medium and low). It is worth noting that a B grade is not considered a low grade in any other subject. The high tariff intake is growing strongly while the medium tariff intake is falling gently. The low tariff intake has fallen from 1,000 to less than 400 shared between 15 institutions.

As a consequence, there is a loss of diversity of provision in A\*A\* institutions, and a loss of diversity of intake with students achieving below A\*A\* not being able to study mathematical sciences.

If the trends continue, departments offering low tariff entry will close.

So what?

- Opportunities for pupils from disadvantaged backgrounds/regions to study maths are diminishing.
- Graduate employability for maths grads is high: there is no evidence of an over-supply of maths graduates nationally.
- Mathematics graduates going into teaching are frequently drawn from the middle to low tariff HEIs. Reducing the number of students at these HEIs may impact on teacher recruitment
- Mathematics graduates from high tariff HEIs are more likely to leave their region of domicile (with London a major destination), leading to a loss of maths grads to the regions. This may particularly affect SMEs

There is no evidence that low tariff undergraduates are overburdened and their opportunities are quite similar to other undergraduates. Neither is there any reduction in employability. Medium and low tariff entrants feed teaching PGCEs (high tariff graduates are the most likely to leave) and smaller businesses. The loss of medium and low tariff undergraduates could close off the supply of mathematical science graduates to all but the large employers.

Group discussion followed around three questions:

- What actions do JMC members think might be affecting this issue at school level?
- What questions and data could be usefully analysed to determine if this problem goes beyond a recruitment issue for low tariff HEIs?
- What practical steps might be taken, and by who, to shift trends?

Feedback included the following:

- High tariff graduates tend to leave the local area.
- Cambridge researchers tend not to be home-grown nor female.
- Teachers tend to come from B grade students. Without these the responsibility for promoting teaching falls on high tariff HEIs.

- Were Scottish qualifications included? The first report used UCAS data. Websites were used to gain information on Scottish tariffs. There are only a small number of Scottish universities in the high tariff grouping.
- What fraction of high tariff students go into mathematics? There has been a change over the last ten years.

It is hoped to commission further research on this topic.

#### **14-19 Education (Jennie Golding, UCL IoE)**

The outline report has been circulated. JG stated that all aspects of gender were conflated with sex and was binary. She stated that the problem is known and that post-16 participation is skewed in favour of males.

There is little research evidence of gender difference in performance although some exists in narrow aspects such as the mental rotation of 2D and 3D shapes. Differences in affect exist by early primary. There is a connection with language and structure to the ideas they are aligned to.

Mathematics education in the UK was in a state of flux before the pandemic. Structures across the UK have diverged since 2016.

Up to the age of 16, girls enter qualifications in comparable numbers to boys and perform in line with them or better. The variety of assessment has enhanced performance especially for girls.

At A level, Core, Higher and Advanced Higher participation is skewed by gender and is largely the preserve of higher performers. In Northern Ireland the skew (except for Core) is less, but still exists. The effect of reduced AS entries is still unclear.

Key issues are around provision for previously low-attaining students, gender bias within most advanced school mathematics pathways, and under-participation by previously moderate- or high-attaining students.

Discussion feedback included:

- The importance of social activities – the inclusion of discussion and group work; less purely didactic teaching; opportunities for informal interactions e.g., drop-ins.
- The importance of teaching approaches leading to the making of connections.
- Links to other subjects.
- The nature of the subject – GCSE (course work leading onto A level).
- The impact of motivation e.g., career aspirations.
- Concern over the 'pipeline'.
- The ability of students to choose when they have breadth of success.
- The impact of influences such as parents.
- Students' self-perception of their ability and success.

#### **5-14 Education (Maria Pampaka, Manchester)**

The detailed presentation (attached separately) was spoken to. There were many similarities with the findings from the work on the 14-19 age group.

Ems Lord commented that there appeared to be a theme running through that the social side of mathematics learning was important. There is a question as to how schools build in a sense of belonging.

John Neeson commented that there was insufficient research into the teaching and learning of space and movement, and doubted that it is being taught well enough.

Ems Lord stated that the Government has done some work on pattern with publications and training in production. She also drew attention to work by Sue Gifford. The value of cross-phase conversations was highlighted.

## **14 Conclusion**

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

## **15 Dates of future meetings**

- Thursday 9 June 2022 – venue to be arranged
- Thursday 10 November 2022 – venue to be arranged