Focus of the Month
December 2015

Technology

This month we are focusing on the resources, events and professional development MEI offers to support the use of technology in the teaching and learning of maths.

Resources

All of the resources listed here are available **free of charge**, unless otherwise indicated.

General ideas for using technology

MEI's website has an area devoted to advice about the use of technology in the teaching and learning of maths, featuring general advice on how to get the most of using technology in the classroom.

We have also produced a series of student tasks for use in the classroom when teaching A level Mathematics. Versions of the tasks have been designed for Autograph, Casio graphical calculators, Desmos, GeoGebra, and TI-Nspire.

We have also produce a table of guidance for integrating technology into your scheme of work. This features ideas for how to use technology for all the topics in the new A level Mathematics (for first teaching 2017).

MEI's annual conference offers the opportunity for maths teachers and enthusiasts to share, explore, discuss and evaluate ideas for the classroom. Sessions cover a wide variety of topics, ensuring that there is always something for everyone, regardless of specification. Presentations and handouts from past MEI annual conference sessions include many ideas for using technology in maths. Here are some examples from our 2016 conference to give you a flavour:
- GeoGebra for Beginners
- Teaching Statistics in the new A level using graphing technology
- Teaching Further Pure using graphing technology

GeoGebra Institute of MEI

Did you know that MEI is a GeoGebra Institute? We make extensive use of GeoGebra in many of our resources and professional development courses.

As well as professional development courses in learning how to use GeoGebra, we have also produced an online self-study guides for Getting Started with GeoGebra

MEI/Casio Teacher Network

MEI and Casio have been working with a group of teachers across England to develop their use of technology in A level Mathematics, including the use of graphical calculators, spreadsheets, graphing software, and dynamic geometry.

The teachers are providing training on using the graphical calculators to local networks and they have trialled a series of A level Classroom Tasks for using Graphical Calculators which have been improved based on their feedback.

Video on using technology in maths

At the 2014 MEI Conference Tom Button, MEI's Learning Technologies Specialist, and Charlie Stripp, MEI's Chief Executive, gave a plenary on using technology in maths. They also recorded a short video discussing Integrating technology into the teaching and learning of maths.

Maths Apps: Making maths fun – for your students and you too!

MEI has recently produced two exciting free maths games for students. These have now been downloaded over 55,000 times.

Sumaze! is a free problem-solving app that includes puzzles involving arithmetic, inequalities, the modulus function, indices, logarithms and primes. Sumaze reached no.3 in top free educational apps for Android! It is also available for iPhone and iPad.

Sumaze 2! is also free – and, while providing a challenge for all, should be accessible to slightly younger players than Sumaze! its puzzles fractions, decimals and percentages. Sumaze 2! also available for Android devices, iPhone and iPad.

Both of these games are useful for students revising for GCSE and for preparing for post-GCSE maths courses, such as AS/A level Mathematics and Core Maths.

Ritangle

Ritangle, a team maths competition organised by Integral for students of A level Mathematics, took place between October to December 2016. One aim of the competition was to encourage the use of technology to solve mathematical problems.

Technology can illuminate aspects of a problem may have otherwise been difficult to spot and it can be great fun. Technology needed for Ritangle ranges from using spreadsheets, to using graphing software, right the way through to coding. Computer Algebra Systems are useful for some Ritangle questions too - these can perform algebraic processes in the same way that calculators carry out arithmetic. You can see the Ritangle questions and advice about getting started with technology at integralmaths.org/ritangle.

Programming

As well as leading to a valuable transferable skill, programming tasks can help students develop their understanding of mathematical topics. MEI has produced resources to help students get up and running with programming and series of coding challenges related to GCSE and AS level Mathematics. These could be used as a separate enrichment activity or incorporated into lessons as appropriate.

- Getting started with Casio programming
- Getting started with Python
- Programming tasks suitable for GCSE Mathematics students
- Programming tasks suitable for AS Mathematics students

Integral

Integral, MEI's online platform to support the teaching and learning of A level Mathematics and Further Mathematics for all specifications, includes many excellent technology resources.

New for 2016/17 are learning Walkthroughs for mechanics. These are sequences of activities, most of which are based on GeoGebra, which students can follow independently or in class to explore the initial ideas in an area of Maths.

- Try a Mechanics Walkthrough: Velocity of Projectiles
- Try a Mechanics Walkthrough: Objects on Slopes

Integral supports students' own use of technology as a creative tool. GeoGebra tasks which students can work through to investigate concepts for themselves are being developed for inclusion in Integral.

This is just a small part of what Integral has to offer teachers and students of AS/A level Mathematics and Further Mathematics. Visit integralmaths.org for more information.

Further Pure with Technology

Further Pure Mathematics with Technology (FPT) is an exciting and innovative MEI A level unit that requires students to have access to technology for the teaching, learning and assessment. Information about FPT is available on the MEI website.

FPT, approved by Ofqual and first examined in June 2013, is an optional A2 Further Mathematics unit that can be studied alongside (or after) Further Pure 2. We are very pleased that FPT has been retained as an optional unit in OCR's submission for MEI Further Mathematics (first teaching September 2017).

Students are expected to have access to software for the teaching, learning and assessment that features a graph-plotter, spreadsheet, CAS and programming language. They will observe the effect of changing parameters displayed in different representations, which is useful for aiding generalisation, and will engage in investigative approaches to problem solving.

MEI is running six free live online sessions to for teachers delivering or interested in delivering FPT during December 2016 and January 2017. Please contact richard.lissaman@mei.org.uk for details of this. Even if you have missed some sessions you can catch up by watching recordings.

Professional Development

MEI's FRESH ideas for getting students using GeoGebra is aimed at looking at ideas for using GeoGebra at Key Stage 3 and 4.The FMSP also runs a number of GeoGebra courses for both GCSE and A level Mathematics. These are run through face-to-face CPD courses, Live Online Professional Development and teacher networks.

The annual MEI Conference features many sessions on using technology in both GCSE and A level Mathematics. The 2016 MEI Conference will take place between 30th June and 2nd July at the University of Bath and the schedule of sessions will be published soon.

If you are interested in hosting a bespoke professional development session in using technology at your school please contact Tom Button, MEI's Learning Technology Specialist.