

The logo for Mathematics Education in Industry (MEI) features the letters 'MEI' in a bold, sans-serif font. The 'M' and 'I' are dark blue, while the 'E' is a lighter, vibrant blue.

**Innovators in  
Mathematics  
Education**

**Mathematics in  
Education and  
Industry**

*50 years at  
the forefront of  
Mathematics  
Education*

# Mathematics in the digital age – using an online classroom to engage, enthuse and enlighten

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[www.mei.org.uk](http://www.mei.org.uk)

Registered charity

MEI exists to improve education in mathematics and to support mathematics learning in the workplace



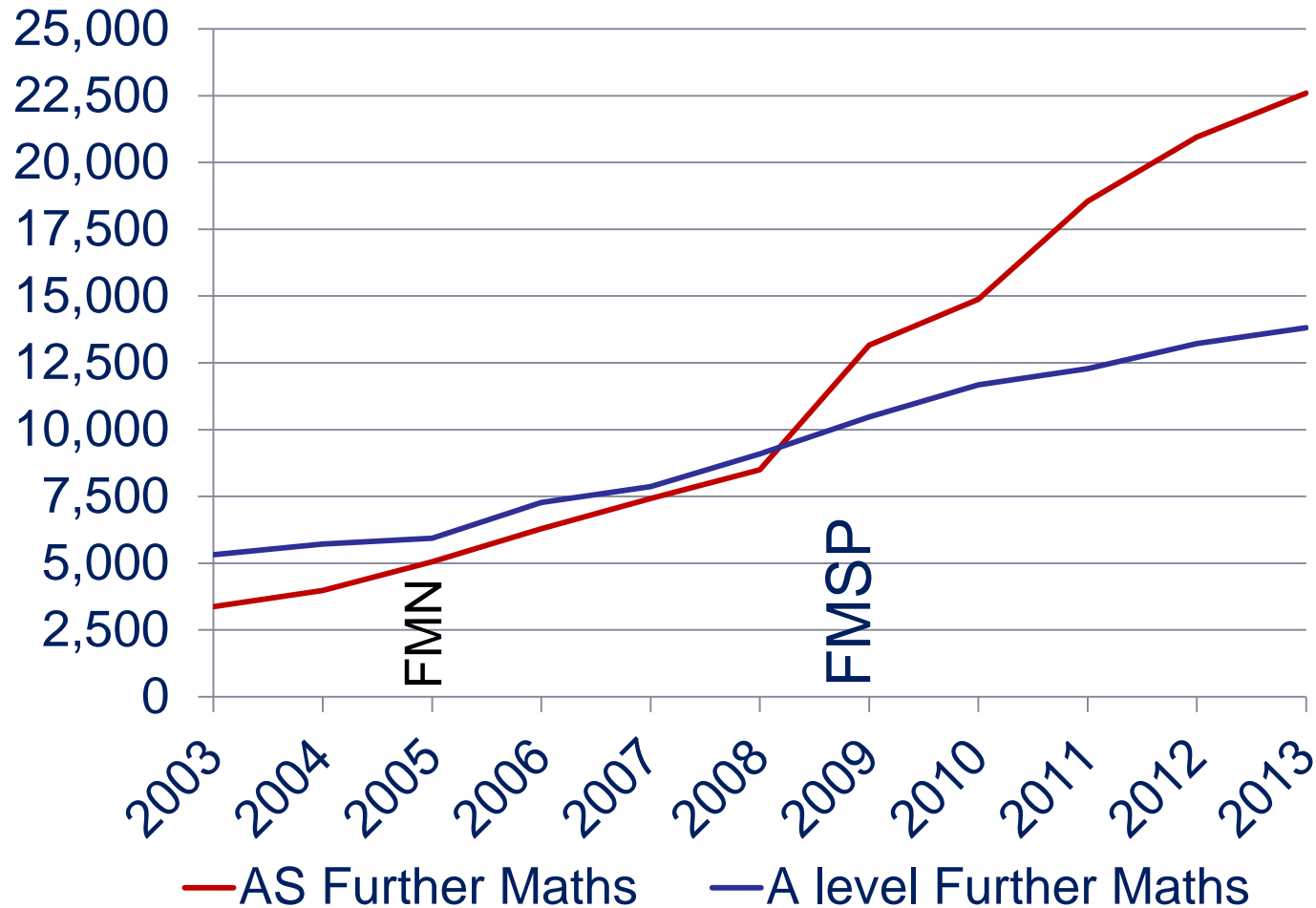
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A level specification and cross-specification resources

Consultation responses



# A level Further Mathematics numbers



# Abstract

MEI have developed a number of *techniques and strategies* for using online classroom software in delivering *tuition, revision, enrichment* and *professional development*.

Though predominantly with respect to 16-19 education, there is much that can be applied so as to *facilitate learning* in an *university context*.

The software used by MEI is *Blackboard Collaborate*, though there is large overlap in the facilities found in the various online classroom software currently available.

# Blackboard Collaborate

The screenshot shows the Blackboard Collaborate interface. On the left, there are three main panels: 'AUDIO & VIDEO' at the top, 'PARTICIPANTS' in the middle, and 'CHAT' at the bottom. The 'AUDIO & VIDEO' panel includes a video player, 'Talk' and 'Video' buttons, and a volume slider. The 'PARTICIPANTS' panel shows a list of users, with 'Stephen Lee Moderator (You)' highlighted. The 'CHAT' panel displays a chat history and a text input field. On the right side of the interface, there is a toolbar with icons for 'New Page', 'Delete Page', 'Fit Page', 'Load Content', and 'Record'. A vertical toolbar on the left side of the main content area contains icons for emoticons, writing, and drawing tools. Red arrows point from text labels to these specific features.

- Share desktop/applications
- Audio + Video
- Emoticons/feedback
- Writing/Drawing tools
- Participant list
- Chat

## **Tuition** / Revision / Professional Development

- Various tuition models are used, from face-to-face, to all online (LOT) to a mixture of the two (LIL FM)
- Over 350 students each year receive tuition wholly or in part online
- ‘Class’ sizes vary from 1 student up to ~20 (LIL FM)
- ‘Classes’ cover range of areas from A level Mathematics modules through to STEP/AEA



## Tuition / **Revision** / Professional Development

- As well as numerous ‘physical’ revision events across the country a comprehensive selection of live online revision events are held each year
- 90-120 minutes, one-off, live events, which are recorded:
  - ~3000-5000 students attend the online sessions each year
  - ~5000-7000 views of the recordings of the sessions each year
- ~1800 feedback responses from the live online revision events between January 2011 to Summer 2013

## Tuition / Revision / **Professional Development**

- Various CPD events, but there are specific Live Online Professional Development (LOPD) courses
- Over 450 teachers per year take part in dedicated online CPD courses (LOPD), or extended CPD courses (12-14 months, i.e. TAM/TFM) that incorporate online CPD
- Publications in proceedings of the International Conference on Technology in Mathematics Teaching (ICTMT) in 2009, 2011 and 2013 on LOPD

# To engage, enthuse, enlighten...

- What works best in the ‘real’ classroom?
- How can this be transferred to the online classroom, with its inherent limitations?
- PowerPoint slides have their place, but the teaching needs to be more creative!
- How can the ‘tools’ available be utilised?

# Techniques and strategies

- Be interactive
  - Seek feedback/confirmation of understanding throughout a session (emojicons/chatbox)
  - Run quick quizzes via polling (good for large groups)
  - Ask participants to annotate the whiteboard, i.e. 'matchings' (use different colours, for different people)
  - Share applications that are used outside of the online environment (Geogebra, Mathematica, Matlab)

# Techniques and strategies

- Give participants time to think and to do maths!
  - Use breakout rooms (create smaller groups/individuals)
- Get participants to use the audio
  - Can be difficult depending on situation, but ask them to speak the mathematics and the tutor writes it down
- Put hyperlinks into the Chatbox (so they're active)
- Record sessions (so that they can be replayed)

# Issues

- Internet/firewall connection issues
- Sound issues (much improved on latest version)
- Off-task communication, i.e. using instant chat  
(Can be better handled with a second moderator online)
- Time to prepare (but can be used as a mechanism to do mathematics with no preparation)

# Opportunities for use in HE

- Individual one-to-one basis
  - Record for future use by other students?
- Small group tutorials
- Pre-scheduled support ‘classes’
- Whole modules/courses (i.e. Open university)  
=====
- Staff professional development
- Guest speaker lectures/conferences [stemxcon.com](http://stemxcon.com)

# Final thought....

- MEI has extensive experience of using this technology, in numerous areas, with lots of students and teachers, in a positive, effective manner
- The technology has come a long way in recent years and now may be the time for individuals in HE to consider if they could utilise such tools in their teaching and learning



# Contact

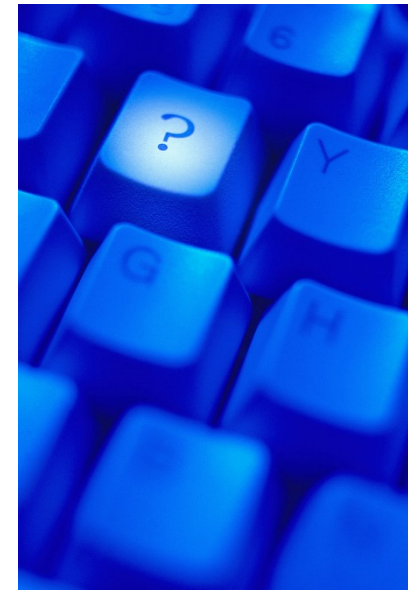
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**QUESTIONS**  
FOUND IN GOOGLE AUTOCOMPLETE

**WHY DO WHALES JUMP**  
**WHY ARE WITCHES GREEN**  
**WHY ARE THERE MIRRORS ABOVE BEDS**  
**WHY DO I SAY UH**  
**WHY IS SEA SALT BETTER**  
**WHY ARE THERE TREES IN THE MIDDLE OF FIELDS**  
**WHY IS THERE NOT A POKEMON MMO**  
**WHY IS THERE LAUGHING IN TV SHOWS**  
**WHY ARE THERE DOORS ON THE FREEWAY**  
**WHY ARE THERE SO MANY SACHS/DIE RUNNING**  
**WHY ARE THERE ANY COUNTRIES IN ANTARCTICA**  
**WHY ARE THERE SCARY SOUNDS IN MINECRAFT**  
**WHY IS THERE KICKING IN MY STOMACH**  
**WHY ARE THERE TWO SLASHES AFTER HTTP**  
**WHY ARE THERE CELEBRITIES**  
**WHY DO SNAKES EXIST**  
**WHY DO OYSTERS HAVE PEARLS**  
**WHY ARE DUCKS CALLED DUCKS**  
**WHY DO THEY CALL IT THE CLAP**  
**WHY ARE KYLE AND CARTMAN FRIENDS**  
**WHY IS THERE AN ARROW ON AANG'S HEAD**  
**WHY ARE TEXT MESSAGES BLUE**  
**WHY ARE THERE MUSTACHES ON CLOTHES**  
**WHY ARE THERE MUSTACHES ON CARS**  
**WHY ARE THERE MUSTACHES EVERYWHERE**  
**WHY ARE THERE SO MANY BIRDS IN OHIO**  
**WHY IS THERE SO MUCH RAIN IN OHIO**  
**WHY IS OHIO WEATHER SO WEIRD**  
**WHY ARE THERE MALE AND FEMALE BIKES**  
**WHY ARE THERE BRIDESMAIDS**  
**WHY DO DYING PEOPLE REACH UP**  
**WHY AREN'T THERE UNKINDS ANYMORE**  
**WHY ARE OLD KINGOMS DIFFERENT**

**WHY DO TESTICLES MOVE**  
**WHY ARE THERE PSYCHICS**  
**WHY ARE HATS SO EXPENSIVE**  
**WHY IS THERE CAFFEINE IN MY SHARPOO**  
**WHY DO YOUR BOOBS HURT**  
**WHY ARE THERE SLAVES IN THE BIBLE**  
**WHY DO TWINS HAVE DIFFERENT FINGERPRINTS**  
**WHY ARE AMERICANS AFRAID OF DRAGONS**  
**WHY IS HTTPS CROSSED OUT IN RED**  
**WHY IS THERE A LINE THROUGH HTTPS**  
**WHY IS THERE A RED LINE THROUGH HTTPS ON FACEBOOK**  
**WHY IS HTTPS IMPORTANT**  
**WHY AREN'T MY ARMS GROWING**  
**WHY ARE THERE JEESKS**  
**WHY DO I FEEL DIZZY**  
**WHY AREN'T ECONOMISTS RICH**  
**WHY DO AMERICANS CALL IT SOCCER**  
**WHY ARE MY EARS RINGING**  
**WHY ARE THERE SO MANY AVENGERS**  
**WHY ARE THE AVENGERS FIGHTING THE X MEN**  
**WHY IS WOLVERINE NOT IN THE AVENGERS**  
**WHY ARE THERE SURVIVORS OF DANTS**  
**WHY IS THERE PHLEGM**  
**WHY ARE THERE SO MANY CROWS IN ROCHESTER, MN**  
**WHY IS PSYCHIC WEAK TO BUG**  
**WHY DO CHILDREN GET CANCER**  
**WHY IS POSEIDON ANGRY WITH ODYSSEUS**  
**WHY IS THERE ICE IN SPACE**  
**WHY ARE THERE GHOSTS**  
**WHY IS THERE AN OWL IN MY BACKYARD**  
**WHY IS THERE AN OWL OUTSIDE MY WINDOW**  
**WHY IS THERE AN OWL ON THE DOLLAR BILL**  
**WHY DO OWLS ATTACK PEOPLE**  
**WHY ARE AK 47s SO EXPENSIVE**  
**WHY ARE THERE HELICOPTERS CIRCLING MY HOUSE**  
**WHY ARE THERE GODS**  
**WHY ARE THERE TWO SPOOKS**  
**WHY IS MT VESUVIUS THERE**  
**WHY DO THEY SAY T MINUS**  
**WHY ARE THERE OBELISKS**  
**WHY ARE WRESTLERS ALWAYS WET**  
**WHY ARE OCEANS BECOMING MORE ACIDIC**  
**WHY IS ARWEN DYING**  
**WHY AREN'T MY QUAIL LAYING EGGS**  
**WHY AREN'T MY QUAIL EGGS HATCHING**  
**WHY AREN'T THERE ANY FOREIGN MILITARY BASES IN AMERICA**

**WHY AREN'T THERE DINOSAUR GHOSTS**  
**WHY IS EARTH TILTED**  
**WHY IS SPACE BLACK**  
**WHY IS OUTER SPACE SO COLD**  
**WHY ARE THERE PYRAMIDS ON THE MOON**  
**WHY IS NASA SHUTTING DOWN**  
**WHY ARE THERE TINY SPIDERS IN MY HOUSE**  
**WHY DO SPIDERS COME INSIDE**  
**WHY ARE THERE HUGE SPIDERS IN MY HOUSE**  
**WHY ARE THERE LOTS OF SPIDERS IN MY HOUSE**  
**WHY ARE THERE SPIDERS IN MY ROOM**  
**WHY ARE THERE SO MANY SPIDERS IN MY ROOM**  
**WHY DO SPIDER BITES ITCH**  
**WHY IS DYING SO SCARY**  
**WHY IS THERE NO GPS IN LAPTOPS**  
**WHY DO KNEES CLICK**  
**WHY AREN'T THERE E GRADES**  
**WHY IS ISOLATION BAD**  
**WHY DO BOYS LIKE ME**  
**WHY DON'T BOYS LIKE ME**  
**WHY IS THERE ALWAYS A TRIP UPDATE**  
**WHY ARE THERE RED DOTS ON MY THIGHS**  
**WHY IS LYING GOOD**  
**WHY IS THERE HELL IF GOD FORGIVES**  
**WHY IS SEX SO IMPORTANT**  
**WHY IS LIFE SO BORING**  
**WHY AREN'T THERE GUNS IN HARRY POTTER**  
**WHY ARE ULTRASOUNDS IMPORTANT**  
**WHY ARE ULTRASOUND PAINED EXPENSIVE**  
**WHY IS STEALING WRONG**  
**WHY ARE DOGS AFRAID OF FIREWORKS**  
**WHY IS THERE NO KING IN ENGLAND**