

Technology *enabled* mathematical science education

Bridging Research and Practice

Emma Cliffe

Defining the problem

- ▶ Enabling access
 - ▶ Defining the problem
 - ▶ From research to practice
 - ▶ Change
- ▶ What next?
 - ▶ Dissemination and core challenges

We want...

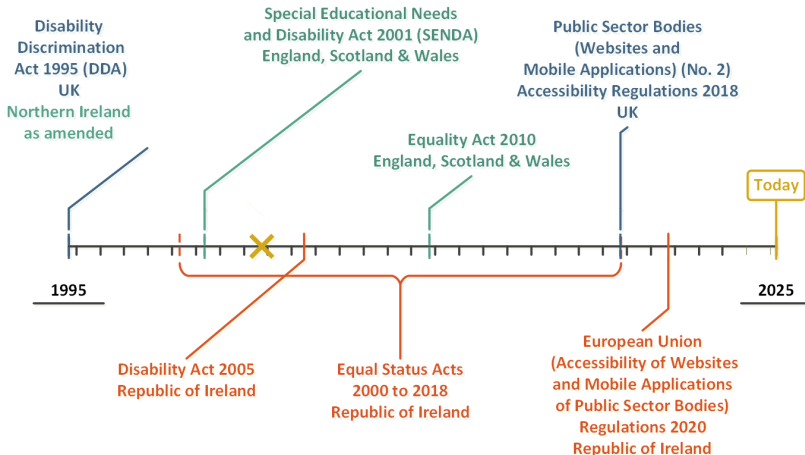
... to enable access to mathematical content by:

- ▶ People using assistive technology
- ▶ People reading on small screen devices, e-book readers...
- ▶ People searching, copying and pasting
- ▶ People verifying reproducibility of results
- ▶ Software parsing, transforming, generating and manipulating input and output
- ▶ AIs consuming and generating mathematical content...?

But...

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

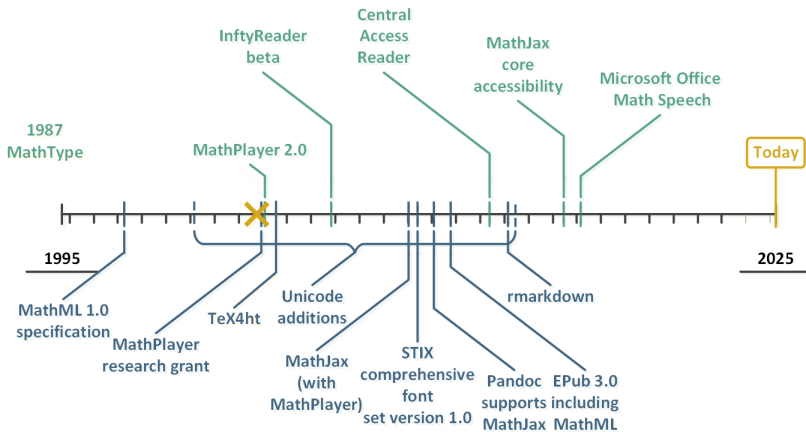
Legal



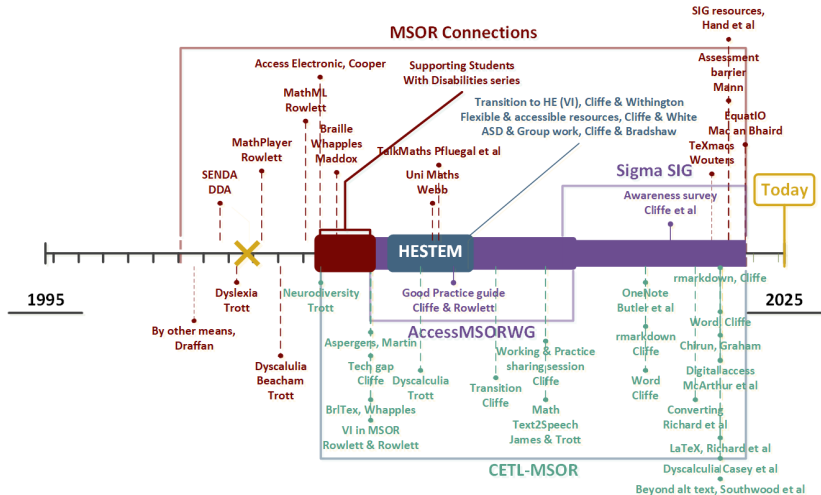
From research to practice

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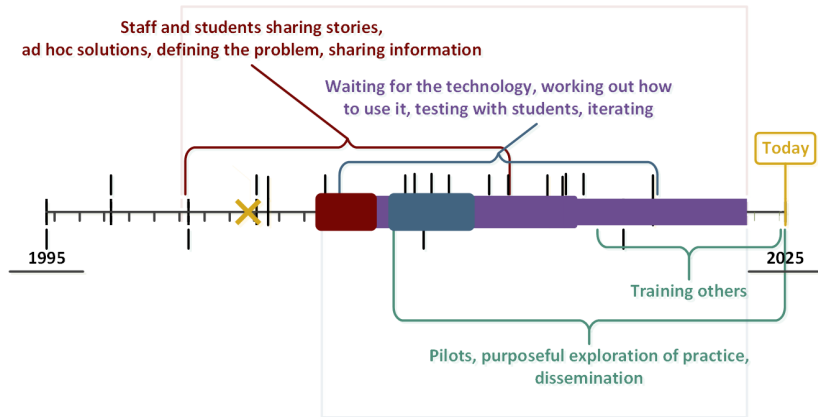
Technical



Practitioners




Phases



Change

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CLT & Lecturers

 **Learning and Teaching**

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Sub Categories

No categories

Need Support?

Can't find the answer you're looking for?

[Contact a CLT team](#)



Mathematics Accessibility

This page provides a list of resources and recommendations

- [Introduction to Accessible Technical Content](#)
- [How to create accessible figures and diagrams](#)
- [Accessible Maths with Microsoft Equation Editor](#)
- [Writing accessible documents using bookdown](#)
- [Moodle guidance for accessible maths](#)

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Lecture notes (pdf)



Last updated on Feb 3rd.



Lecture notes (html)



Week 3: Feb 17



Problem Sheet 3



Problem Sheet 3 (html)



Problem Sheet 3 Solutions



Problem Sheet 3 Solutions (html)



Problem class recording

MASH & Everyone!

Maths support

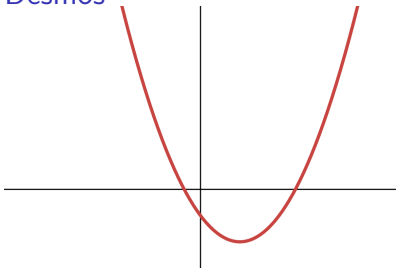
On this page

- Directing students to us
- Maths teaching support
- Individual student referrals

MathJax

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Desmos



Interactive accessible version of the quadratic graph

What next?

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Getting started...

- ▶ RMarkdown, Bookdown and possibly ClavertonDown
- ▶ Quarto
- ▶ Chirun
- ▶ LWarp
- ▶ PreTeXt
- ▶ Word
- ▶ Desmos and Geogebra
- ▶ BrailleR

Dissemination

We are still doing this, now others are too. . . Can you:

- ▶ Have a go yourself and tell others?
- ▶ Join JISC Accessibility Community Maths Working Group
- ▶ Consider and communicate regarding the implications for mathematical pedagogy?
- ▶ Consider and communicate regarding the implications for open and reproducible science?
- ▶ Build functionality into software and packages you create so that users automatically produce accessible output?

Diagrams

- ▶ It is possible to use Desmos, some functionality of Geogebra and the BrailleR package to help make accessible diagrams
- ▶ This is nowhere near sufficient or flexible enough to represent the variety of diagrams we produce in e.g. TikZ
- ▶ These formats are not easily consumed and manipulated by other software or AIs

Meaning

- ▶ We are no longer losing syntactic structure
- ▶ We are still losing enough of the semantics *known to the author* that things we want to do are affected
 - ▶ Sometimes the author encodes these in their LaTeX
 - ▶ Not always though...
- ▶ Consider

$$|\{(a, b) \mid a \in A, b \in B\}|$$

Questions and discussion

Thank you for your time! Papers for discussion:

- ▶ Authoring Web-accessible Mathematical Diagrams.
- ▶ Author Intent: Eliminating Ambiguity in MathML., Pre-print

Slides:

My email address: E.H.Cliffe@bath.ac.uk

