

sigma Accessibility SIG

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SIG Details

- Set up in 2016
- Establish main student accessibility barriers encountered by staff teaching mathematics or providing MLS across Ireland and the UK.
- Recommendations
 - Resources
 - Training
 - Communication

Mathematics instructors' awareness of accessibility barriers for disabled students

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[Received March 2019; accepted July 2019]

In this paper, we discuss the results of a staff survey on accessibility barriers to participation and success for disabled students in higher education in the UK and Ireland. We focus on the range and complexity of student difficulties encountered by staff involved either in the lecturing of mathematics or the provision of Mathematics Learning Support. We report on the range of supports available to both staff and students in these situations and their varying levels of awareness and implementation of these supports. We close with a brief overview of how we intend to use the results of this survey to both increase awareness of existing appropriate supports and develop additional services to improve student accessibility.

1. Introduction

Recent decades have seen a steady increase in the numbers of disabled students who have disclosed accessibility barriers to participation and success in higher education (HE) in Ireland and the UK. This increase is also reflected among students who are studying mathematics and/or statistics or subjects with high mathematical or statistical content (Equality Challenge Unit, 2017; AHEAD Educational Press, 2018).

Students who struggle with mathematics may seek additional help directly from their instructors or avail of Mathematics Learning Support (MLS), if it is available in their institution. MLS is support provided to students in addition to their traditional lectures, tutorials and assignments and aims to give students the opportunity to succeed with the mathematical and statistical demands of their courses (Lawson *et al.*, 2012). It has grown from 'a form of cottage industry practised by a few well meaning, possibly eccentric individuals' (Kyle, 2010, p. 103) to be considered sustainable, securely embedded and valued within individual institutions (Lawson & Croft, 2015). As MLS matures into a professional service, it is reasonable to consider whether the collaborations, communities of practice and continuing professional development opportunities that have been developed support practitioners to meet the needs of the diverse student body they serve and specifically the needs of students with accessibility barriers.

For tutors

- Postgraduate or staff
 - Standalone introduction
 - Brief definition
 - Impacts on maths
 - Strategies to help
- To be used in the room
 - Appropriate for students
 - No jargon
 - Suitable for lamination
 - May encourage disclosure
- Gives a further source of free practical information

For tutors: Dyslexia

Introduction

Dyslexia is lifelong. It can impact on reading, spelling, working memory and organisation. Dyslexia encompasses a spectrum of difficulties that can affect learners in different ways. Some learners will have strong mathematical skills but struggle with accessing and communicating information. Others may struggle with arithmetical procedures and foundational understanding.

The dyslexic student may have some of the following **strengths**:

- Visual thinking
- Taking a holistic approach
- Thinking outside the box
- Problem solving
- Good mathematicians
- Preference for conceptual fluency over procedural fluency

Possible Impacts on Mathematics (suggested strategies in brackets)

- Reading the question text, having to read several times to gain meaning (A, B, C, D)
- Reading a mix of text and non-text, finding it difficult to move from text to notation (A, B, C, D, F)
- Reading, remembering and recalling new technical words (B, E, J)
- Taking notes at speed while a tutor is talking (E, J)
- Difficulty documenting a full solution (H)
- Aligning digits (G)
- Copying errors, e.g. switching digits or signs (G, I, J)
- Remembering and recalling notation, maths facts and procedures (B, E)
- Getting lost in the middle of a problem (C, H, F)

Strategies to Help

- Allow time for the student to read
- Highlight key points in the material
- Use of colour for different aspects of a problem, e.g. different variables
- Use bullet points to break up the text
- Make a list or glossary of technical words, symbols or notation
- Use diagrams where possible
- Use squared paper
- Encourage the student to write down all their working in an orderly way
- Encourage the student to check for mistakes
- Write down what you say as the student will be likely to not recall this

Further information

Further assistance on time management, organisational and other study skills can be accessed from your Disability Department or relevant Student Support.

Further information from Trott C. (2012) Mathematics, dyslexia, and accessibility. In Good Practice on Inclusive Curricula in the Mathematical Sciences, Ed. Cliffe E and Rowlett P.

For managers

- Managers, coordinators and/or trainers of tutors
 - Expanded definition
 - Working with other services
 - Recommended reading
- Recommended provision
 - Equipment and software
 - Physical environment
 - Online environment
 - Additional/alternative provision
 - Tutor training

For Managers: Dyslexia

Further introduction

"Dyslexia is likely to be present at birth and to be lifelong in its effects. It is characterised by difficulties with phonological processing, rapid naming, working memory, processing speed and the automatic development of skills that may not match up to an individual's other cognitive abilities. It tends to be resistant to conventional teaching methods, but its effects can be mitigated by appropriately specific intervention..." (BDA, 2007)

A dyslexic student thinks in different ways, often more visually and can have good insight. They are frequently good mathematicians. However, there will be some issues with reading, writing or memory.

Recommended provision

Equipment and software

It is recommended that you have the following equipment available for helping students with dyslexia:

- Highlighters
- Coloured paper
- Squared paper
- Post-its
- 2-line calculators (which display input and output)

There are a wide range of softwares which students may use for assistance. The website (http://stemenable.referata.com/wiki/Welcome_to_STEM_Enable), currently under construction, will maintain an up-to-date description of softwares and their functionalities. If a student is using a specific software, and you need further guidance, we recommend that you liaise with relevant support staff, e.g. in the Disability Office.

Physical learning environment

A quiet space to work is helpful.

Online learning environment

Provide documents in a format which can be transformed to meet the reader's needs and which can be read aloud and colour annotated, including the equations. Accessible Word documents and accessible web pages are best. Guidelines will be available from sigma (<http://www.sigma-network.ac.uk/>) soon. Provide materials in a choice of formats, e.g. the same concept explained in video, via interactive example and in text.

Additional/alternative provision

Think about providing 1:1 support.

Tutor training

We recommend that you include a discussion on these Manager and Tutor leaflets in tutor training at your institution. Over the coming years, accessibility training will become an important feature of maths support tutor training at local and national levels. For further information on tutor training, contact your maths support network.

Progress & Next Stages

- Dyslexia resources trialled: Heraty et al. (2021) A trial of resources to support students with dyslexia. *MSOR Connections* 19(1), 13-21.
- Dyspraxia, Dyscalculia, and Mature Student resources piloted at Maynooth University and the University of Bath, report to appear.
- Next steps will involve:
 - focus on technological accessibility matters via the JISC Accessible Maths Working Group.
 - focus on cognitive disorders via the sigma SIG.

Get in touch

- The Accessibility SIG is looking for new people to get involved to help develop and trial further resources.
mash-sigma@bath.ac.uk
- For updates on the development of technological accessibility, join the JISC Accessible Maths Working Group <https://www.jiscmail.ac.uk/cgi-bin/webadmin?A0=ACCESSIBLE-MATHS>

sigma Accessibility SIG

<http://www.sigma-network.ac.uk/sigs/accessibility-sig/>