QAA Scotland

Enhancement Themes

Scottish Funding Council
Comhairle Maoineachaidh na h-Alba

A Digital Accessibility Toolkit for STEM subjects

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QAA Scotland's 5th International Enhancement Conference
Shaping the Student Experience Together: 20 Years of Enhancement

Universal Design for Learning and Accessibility

Why does it matter?

Universal Design for Learning

- Universal Design for Learning (UDL)
    - Approach to Learning and Teaching that encourages us to reflect on how we teach what we wish to teach;
    - Aims at not creating barriers to learning;
    - Aims at considering the diversity of our learners in the classroom;
- The framework provides multiple means of:
    - Engagement – encourages teachers to look for ways to motivate students;
    - Representation – offering information in more than one format;
    - Action and Expression – giving students more than one way to interact with the material.

Digital Accessibility
Why does it matter?

- Representation – offering information in more than one format;
- Action and Expression – giving students more than one way to interact with the material.
- Digital accessibility provides a framework to ensure the above objectives.

Digital Accessibility
Why does it matter?

- It benefits everyone:
  - Creating interactive documents that display correctly on various devices and with various browsers;
  - Designing adaptable documents: modifying colours, fonts.
- We have an obligation to support wider participation and inclusivity.
- It is a legal requirement through the Equality Act 2010 and the 2018 Public Sector Body Accessibility Regulations.

Accessibility for STEM Subjects

Creating accessible material

Writing Mathematics

- Many teaching staff use LaTeX to write course material;
  - Typesetting system which is particularly efficient to write advanced mathematics;
  - Academics use LaTeX to write all their documents (papers, research grants, presentations);
  - Schools and departments often have their own templates to generate specific formats for notes, tutorials, labs and exams.

Writing Mathematics

- The problem with LaTeX…
- It generates PDF (great for printing) that are not accessible:
  - Not easily tagged;
  - Equations cannot be read by text-to-speech software;
  - Font type, font size, colours cannot be modified by user directly.

Writing Mathematics

- The alternative is to provide material in HTML format (with MathJax to render the maths), **in addition to PDF**.

- Existing material can be converted:
  - Using tools such as Pandoc and related software;
  - Do not work 100%;
  - Need considerable time and effort to fix content.

- Not a long-term solution!

Writing Mathematics

- Future course material should be written differently (not in LaTeX)
  - Pandoc Markdown, RMarkdown and Bookdown;
  - Allows to generate a PDF and a HTML version of the material;
  - The mathematical objects are written using LaTeX syntax.
- We need to inform and train academics that teach and use LaTeX.

Scottish Maths Support Network (SMSN) dissemination work

Informing and training

Project at the University of Aberdeen

- LaTeX used heavily across the School of Natural and Computing Sciences and School of Engineering.
- **Project 1**: testing and documentation of a range of conversion packages (converting existing LaTeX course material into HTML);
- **Project 2**: staff survey to test and feedback on use of 2 conversion methods and 3 markdown languages (on-going).
- **Next step**: student survey to collect user feedback on HTML documents generated through various methods.

Project at the University of Glasgow

LaTeX, together with complicated stylesheets and packages, used very heavily in Maths department.
Project student 1:

- Created stylesheet and template to ‘match’ existing notes, tutorial sheets and feedback exercise sheets in RMarkdown to output both pdf (as default) and html files (as alternative format)
- Tested with screenreaders and BB Ally

Project student 2:

Automated process by writing Powershell scripts which essentially ‘finds and replaces’ syntax from TeX to RMD.

SMSN Collaboration

- Complex and technical problem with no straightforward solution;
- Aim: document existing solutions and their limitations, inform and train staff
- Means:
  - Maintain a curated toolkit and add to our current bank of resources;
  - Continue to run training workshops aimed at lecturers teaching STEM subjects;
  - Support the development of a resilient community of teachers.

Plans for the Toolkit

- Sample templates for alternative markup languages
- Training resources from workshops
- Guidance documents
  - Alt text
  - Diagrams
  - Graphs
  - Use of colour

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Thank you

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