

CETL-MSOR Conference 2015

Abi James and Clare Trott: Developing maths text to speech to support learners with print impairments.

Mathematical notation is used to represent mathematical concepts via symbols and their spatial location. In order to learn and utilise mathematical concepts, learners must recognise each individual symbol as well as what the symbol represents in its particular location. They must be able to clearly recognise each structure accurately without ambiguity. This can form a particular challenge for learners who struggle to interpret printed materials, for example those with dyslexia or processing difficulty, or learners who are blind or visually impaired. For these learners synthesized speech (through text to speech or screen reader applications) often provide assistance with decoding and comprehending text. Recent studies have highlighted that learners with reading difficulties may see improved maths performance when content is read aloud with computerised speech and synchronised highlighting. Until now, it has proved technically challenging to provide similar methods of audio decoding for maths notation due the spatial complexity that needs to be represented. Further, mathematical notation and its language equivalents vary with the complexity of the mathematics and the field it is being applied to.

The STEMReader project set out to develop additional text-to-speech support and semantic representations of maths notation to assist students with poor English, difficulties with reading or processing mathematical notation. Throughout the project, learners from GCSE through to degree level were invited to contribute feedback to aid the development of the tool. This presentation will explore the background to the STEMReader project and the feedback provided by students at Loughborough University and other organisations. Initial feedback has highlighted the requirement for maths notation to be verbalised differently based on the user preferences and difficulties (e.g. language or sensory barrier), the learning context (e.g. proof reading or assessment situation) or the mathematical content (e.g. subject specific notation). Students noted that through accurate speech feedback they were able to identify errors in their notation and it aided revision. In addition students noted the lack of accessible mathematical learning materials limited their use of assistive tools.