

Experiences of using Audio Feedback in Engineering Mathematics Modules

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Introduction

The main purpose of the Engineering Mathematics modules at Edinburgh Napier University is to explain the underpinning mathematical techniques, in areas such as calculus, series and vectors, which are required by the engineering modules. These modules, which might be described as methods modules, are assessed by class test and final examination. Marking this type of work has always resulted in written mathematical feedback for questions, with indications of errors or better ways of solving the question being detailed throughout the script. In addition, for the past four years, audio feedback has been provided. This paper summarises the authors' experience of giving audio feedback during this period, and also the response from the various student cohorts. Audio feedback continues to be provided for students studying engineering mathematics modules at Edinburgh Napier University, and the authors continue to investigate its impact.

Using audio files to give formative feedback to students is a developing area. The use of audio files to give formative feedback to students on their draft assignment submission has been explored by Brearley and Cullen (2012). They offered this feedback to a class of 40 students and had 25 students utilising it. The students valued the feedback, but some would have preferred it to be written. Various other Higher Education institutions have been exploring audio feedback. For example, Rotheram (2009) at Leeds Metropolitan University had a project entitled "Sounds good" which investigated whether digital audio could be used to give students quicker and better feedback on their work, and found that the students were "overwhelmingly positive" about receiving audio feedback and liked both the personal nature and the detail provided. Ekinsmyth (2010) and colleagues from the geography department at the University of Portsmouth experimented with digital audio assessment feedback and found that students felt hearing feedback was more effective and memorable than reading it. Conversely, McGregor et al (2011) experimented with audio feedback on a group of students studying Business Management and found that

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although the students liked receiving the voice mails and listened to them more than once, there was no discernible effect on their performance in the assessment.

Giving summary feedback on maths tests as individual audio files was first investigated at Edinburgh Napier University by Durkacz and Mowat (2012). This work demonstrated that the students find it useful to have both detailed feedback throughout their script and an overall summary of their performance as an audio file. It is clear that the audio feedback has a powerful impact due to it being vocalised, personal and private. The indication from the students is that this makes it more memorable.

Description and Methodology

During the marking process a short summarising paragraph, comprising about four or five sentences, describing the student's performance and highlighting any areas that need revision are noted down. Following feedback from students after the first set of audio files had been produced, it was decided that it was useful if the first sentence of the audio file gave an indication of the overall performance on the test. The paragraphs are then read out loud and recorded as digital MP3 files, which are uploaded to the PC and labelled appropriately, before being made available to the students via the Virtual Learning Environment. The students are able to access the audio files before the marked scripts are returned, to encourage them to listen to the files. Including the mark for each assessment at the end of each student's audio file is currently being experimented with.

Results and Conclusions

Feedback on the audio files has been obtained from the students informally during lecture time, via module questionnaires and also from focus groups. Focus groups have been run for each cohort, at the end of the trimester in which they have received the audio feedback. These are facilitated by a colleague in Academic and Professional Development, who has a talent for getting the students to explain and discuss their thoughts on the effectiveness of the audio files. The feedback which has already been obtained, along with that from this current academic year, will be explored in detail. It has been and is being used to improve the content of the audio files, and to adjust their length. It also gives very interesting insights into the student perception of the feedback, with regard to the importance they attach to the time and effort being expended by the lecturer to produce the audio files.

This work has demonstrated that the students find it useful to have both detailed feedback throughout their script and an overall summary of their performance as an audio file. Feedback from the students has confirmed that, whilst they would prefer individual sessions with the lecturer after each test, an audio file is a good compromise. They find the spoken word more memorable than a typed paragraph. The enthusiastic reception of the audio files by the students, and their willingness to participate in focus group sessions to give their views, demonstrates the value of this work.

There is no denying that it is time-consuming providing audio files for a group of students. However, it is valuable not only for the students but for the lecturer concerned. Rather than simply marking each question in isolation, it is also necessary to look out for related mistakes, particularly good solutions, or errors that have come from an incomplete understanding of earlier work. This results in feedback being given at two levels; detailed feedback as appropriate throughout the script and overall summary feedback. This is the fifth consecutive academic year in which audio feedback has been provided for engineering students studying maths modules, and it will continue to be provided for as long as it is seen to be useful by the students.

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