

Chalmers, Charlotte, MacCallum, Janis, Mowat, Elaine and Fulton, Norma (2014)
Audio feedback: richer language but no measurable impact on student
performance. *Practitioner Research in Higher Education*, 8 (1). pp. 64-73.

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CHALMERS, MACCALLUM, MOWAT & FULTON: AUDIO FEEDBACK: RICHER LANGUAGE BUT NO MEASURABLE IMPACT ON STUDENT PERFORMANCE

Audio feedback: richer language but no measurable impact on student performance

Practitioner Research
In Higher Education
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University of Cumbria
Vol 8 (1) pages 64-73

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Abstract

Audio feedback has been shown to be popular and well received by students. However, there is little published work to indicate how effective audio feedback is in improving student performance. Sixty students from a first year science degree agreed to take part in the study; thirty were randomly assigned to receive written feedback on coursework, thirty students received their feedback via audio files. Mean marks awarded for the coursework for each group were not significantly different. The end of module test included questions that specifically assessed topics from the coursework. Overall test results were not significantly different for the two groups, nor were marks for the coursework-specific questions.

Samples of the tutor feedback were analysed and the language categorised. The mean word counts for audio feedback were significantly higher than word counts for written feedback. Analysis of the language used in feedback (measured by word count) indicated significantly higher word counts for audio feedback in the following categories, 'explaining misunderstandings' and 'demonstration of good practice'. Since word counts for audio feedback might be expected to include a number of 'filler' words, the number of comments made under different categories was also compared for audio and written feedback. Significantly more comments were made using audio feedback in the categories 'giving praise', 'explaining misunderstandings', 'demonstration of good practice' and 'justifying marks'. Under the heading 'suggesting approaches to future work' more comments were made using written feedback than audio, although the mean number of comments in both forms of feedback in this category was very low. Whilst marks may not be improved for those students receiving audio rather than written feedback, the feedback given is much richer.

Keywords

Audio feedback; student performance; language of feedback.

Introduction

Providing students with timely feedback is a vital part of their learning experience (Gibbs and Simpson, 2004; Hattie and Timperley, 2007), but despite the time and effort put into providing feedback, this remains an area of Higher Education in which students frequently express dissatisfaction (Sadler, 2010; HEFCE, 2012). Part of the problem may lie in the ambiguity of the meaning of feedback and the 'assessment literacy' of students (Price *et al.*, 2010) so that whilst tutors think they are giving extensive feedback, their students either do not use it and/or do not understand it (MacLellan, 2001; Gibbs and Simpson, 2004). In its simplest form, feedback involves identification of errors and misunderstandings, but in Higher Education, feedback should be addressing much more than this, such as supporting improvements and future development (Gibbs and Simpson, 2004; Ferguson, 2011). Current understanding of feedback places more emphasis on feed-forward (Price *et al.*, 2010) and communication between tutor and student (Nicol, 2010; Dowden *et al.*, 2011).

Citation

Chalmers, C., MacCallum, J., Mowat, E. & Fulton, N. (2014) Audio feedback: richer language but no measurable impact on student performance, *Practitioner Research in Higher Education Journal*, 8(1), January, 64-73.

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Assessing the effectiveness of feedback is fraught with difficulty. As Hattie and Timperley (2007) identify, the timing and type of feedback is important in determining the effect. In some cases feedback has been found to decrease performance (Elder and Brooks, 2008). These authors found that more elaborate feedback on exam questions (given to students on a nursing science course) made no more difference to final scores than simple feedback which just indicated correct/incorrect answers. In some cases, exam questions were answered better in subjects in which students had been given no feedback during the course. The language used in giving feedback is important in determining how students perceive its quality and effectiveness. Weaver (2006) identified feedback which was considered unhelpful to students as falling into four areas; 'comments too general', 'lacked guidance', 'focused on the negative' or 'comments unrelated to assessment criteria'. An investigation into students' perceptions of written feedback, (Lizzio and Wilson, 2008) found that students valued as most effective, feedback which the researchers termed 'developmental', i.e. feedback which guided direction for the student and which could be used in future assignments. More recent work identifies the importance of the emotional response of the student to their written feedback, so that comments written by a tutor might be perceived as negative (and therefore be less effective) although not intended as such (Dowden *et al.*, 2011).

Traditionally (as in Lizzio and Wilson's work) feedback in Higher Education is given by written comments, either handwritten or typed, but audio feedback, (in the form of audio files) has been shown to be popular and well received by students, as well as by staff (Lunt and Curran, 2010; Gould and Day, 2012). The 'richness' of feedback given can be greater in audio than written feedback (Merry and Orsmond, 2008; Gleaves and Walker, 2013). Merry and Orsmond (2008) classified language used by tutors in their feedback (e.g. 'identifying errors', 'explaining and justifying marks') using a coding system produced by Brown *et al.* (2003) as part of the FAST project (Formative Assessment in Science Teaching). Gould and Day (2012) piloted the use of audio feedback with a cohort of community nursing students and found that they valued the more detailed, supportive and personalised aspects of audio feedback compared to written feedback. Whilst there is evidence that both students and tutors might like audio feedback (Chiang, 2010; Gould and Day, 2012), there is little published work comparing the outcome of audio feedback in improving student performance. Gleaves and Walker (2013) assessed improvements in essay writing amongst students who either received written or aural feedback, but found that the format of feedback had no significant effect on the outcome. Likewise, Macgregor *et al.* (2011) found that, despite high levels of re-use by the recipients, a group of 24 students who were given extensive formative feedback by means of 'voicemails', showed no significant learning gains when compared with the control group.

The study described in this paper was undertaken to address the question in relation to writing a laboratory report. By providing feedback on a piece of coursework in either audio format, or in the more traditional format of written comments, to separate groups of students, and then assessing these students on topics raised by the coursework, we aimed to identify if learning was significantly improved by the format of feedback given. In addition, following the work by Merry and Orsmond (2008), the language used in audio versus written feedback was analysed according to the categories given by Brown *et al.* (2003).

Method

A cohort of 120 students studying on a practical module for a degree in Biological Sciences in the Faculty of Health, Life and Social Sciences at Edinburgh Napier University, were approached and asked for informed consent to take part in the study. The five members of staff involved in teaching this module were also asked. The Faculty Research Ethics Committee gave approval for the study.

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Sixty students signed up for the project as did all five members of staff. The coursework consisted of sections of a laboratory report (introduction, materials and methods, results and discussion), which were then marked using written feedback (hand written or typed) or audio feedback. The students were randomly assigned (30 to each group) to receive either written or audio feedback on their work from all five members of staff. The staff were provided with a proforma for giving written feedback, but they were free to give typed or handwritten comments in addition to the given categories. They were also provided with portable digital recorders (Sony ICD-UX71) to record mp3 files. In giving audio feedback, they were free to do this as they wished, but were given training in using the recorders, and some guidelines e.g. regarding the length of recording (Rotheram, 2009). Audio files were then emailed to students as mp3 files. Staff were informed of the aims and that transcripts would be made of their audio files, but were not told that an analysis of their language would be undertaken since it was felt that this would influence their style in marking. Transcripts of a sample of audio files and samples of written feedback from each tutor were kept for analysis. Comments from the transcripts and written feedback were then categorised making use of the coding system devised by Brown *et al.* (2003) and by Merry and Orsmond (2008). One category used by Merry and Orsmond ('engaging students in thinking') was not used since the length of the assignment (1000 words), and its nature (first year science laboratory reports), meant that comments by markers were better categorised under the other headings.

Mean word counts, and mean number of comments for each category (across all markers) were calculated from the samples, and compared between written and audio feedback. Comparison of means was undertaken using unpaired, two tailed student's t-test. A *p* value of <0.05 was taken to be significant.

At the end of the module, all students undertook an on-line test containing questions about writing a laboratory report. Results from the students who took part in the project were analysed to see if the form of the feedback affected the outcome in the test. In addition, in their next semester, students were assessed by means of a full laboratory report, marks for this were analysed according to the two groups.

Once feedback had been returned, students and staff were asked to complete a questionnaire seeking information about their experience of either giving, or receiving feedback in different formats.

Results

Marks awarded for coursework and on-line test results

The mean marks awarded for the coursework, and for the on-line test questions, for students in the different feedback categories, are shown in Figure 1.

	<i>Audio feedback group n= 30</i>	<i>Written feedback group n= 30</i>	<i>Student's t-test p value</i>
<i>Mean mark awarded for coursework</i>	53.1%	51.1%	0.6
<i>Mean mark for on-line test questions relating to coursework</i>	74.7%	72.6%	0.76
<i>Mean mark for lab report in following semester</i>	54.4%	53.8%	0.86

Figure 1. Mean marks awarded for students in the two feedback groups.

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The remaining cohort of students who did not take part in the study, achieved a mean mark of 46.1% for the coursework (non submission excluded) which was significantly lower than the mean for the audio group ($p = 0.04$), but not significantly different from the written feedback group ($p = 0.2$). For the on-line test, the non-participating cohort achieved 72.4% in the relevant questions. This is very similar to the results from the participating groups (see Figure 1.).

Analysis of language

A comparison of total word counts from the sampled transcripts of audio files and written feedback (from all staff) revealed a significant difference between the two, 482.2 +/- 344.1 words for audio feedback versus 93.9 +/- 88.0 for written feedback (student's t test, two tailed, unpaired $p = 0.04$). The large standard deviation for word counts was mostly attributed to one member of staff who produced audio reports of almost 900 words and written reports which were more than twice as long as those from other staff.

Transcripts of samples of the audio files, and copies of samples of the written feedback were analysed. The numbers of words used by tutors, were categorised under the following headings, as were the number of comments in each category (after Brown *et al.* 2003), see Figure 2.

CATEGORY	EXAMPLE OF PHRASE USED IN AUDIO OR WRITTEN FEEDBACK
<i>Identification of errors</i>	<i>'No explanation of the analysis of raw results' 'I'm not sure why you separated this into three headings?'</i>
<i>Giving praise</i>	<i>'good' 'OK' '...was done well' 'your taxonomic graph was good' 'You've got a good heading'</i>
<i>Correcting errors</i>	<i>'You need to be quoting numbers in those results' 'never number references'</i>
<i>Explaining misunderstandings</i>	<i>'here you are you need to ...instead' 'The reason it's....., but I would have thought..... So if you ever see that in the future....'</i>
<i>Demonstration of good practice</i>	<i>'you then go on to...which was absolutely fine and how it works.' 'you also found a reference forso I was really impressed.'</i>
<i>Suggestions for future study</i>	<i>'refer to tutorial two, that shows you a better way of doing it.' "take care with careless mistakes like this"</i>
<i>Justifying marks</i>	<i>'You haven't lost marks for this, but it's good to do that in the future.' '...you would have been able to achieve good marks if you had done that'</i>
<i>Suggesting approaches to future work</i>	<i>'Please, in future, can you use Arial or Calibri 12 font.'</i>

Figure 2. Examples of phrases used in feedback under different categories

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Comparison of the total word counts in the categories of feedback for the audio versus written feedback groups is shown in Figure 3.

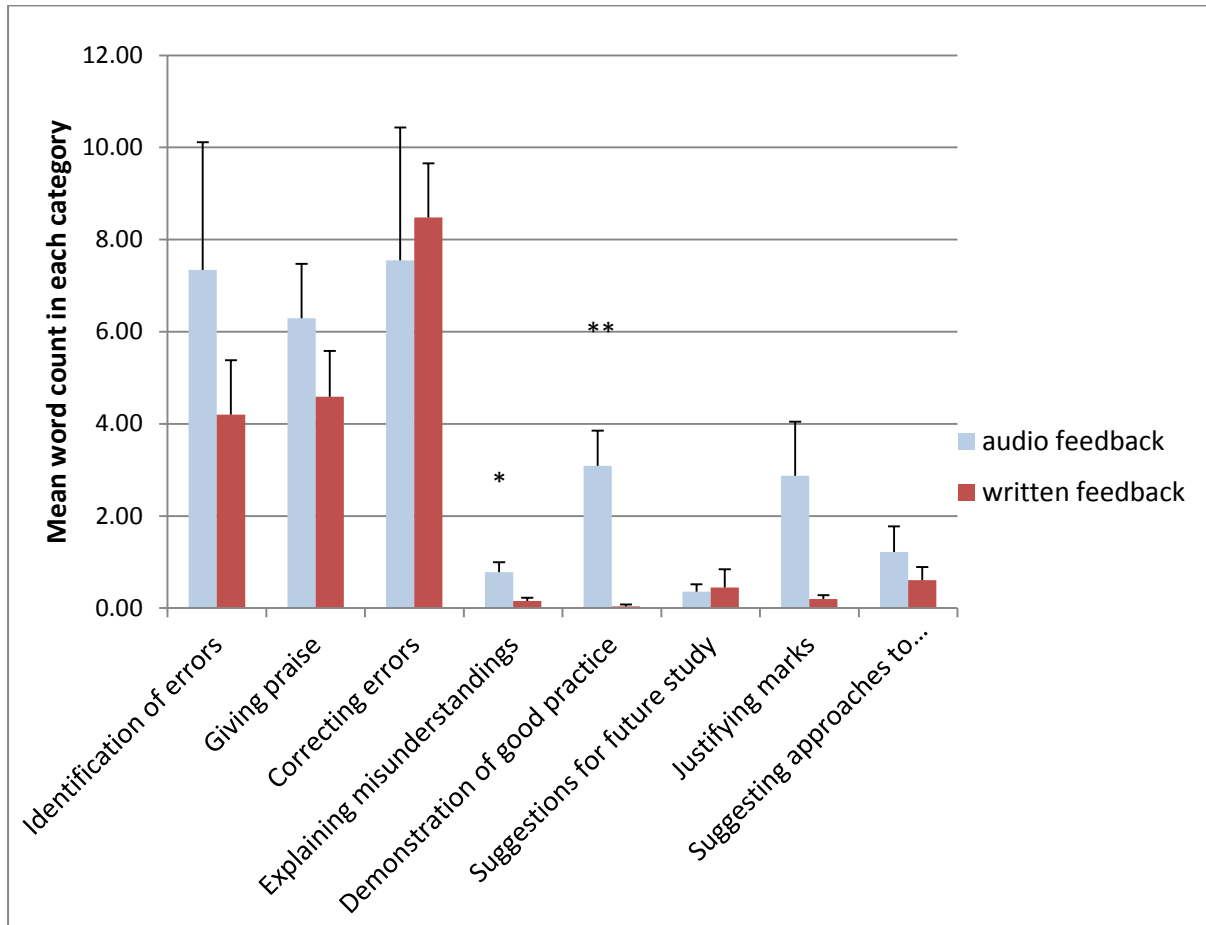


Figure 3. Comparison of the types of comments used in samples of audio versus written feedback. The bar graph shows mean word counts in each category with error bars indicating standard errors of the mean.

There were significant differences between the means indicated by * ($p=0.025$) for 'Explaining misunderstandings' and ** ($p=0.004$) 'Demonstration of good practice' on Figure 2. In the category 'Justifying marks' the difference between word counts for audio feedback and written feedback was not quite significant ($p=0.052$).

It could be expected that word counts for audio feedback would be greater than written feedback since audio feedback would include 'filler' words and instructions to students about which section the reader was referring to. As well as counting the total number of words used in feedback under each heading, the number of comments made was analysed.

Figure 4. compares the number of comments made using written versus audio feedback.

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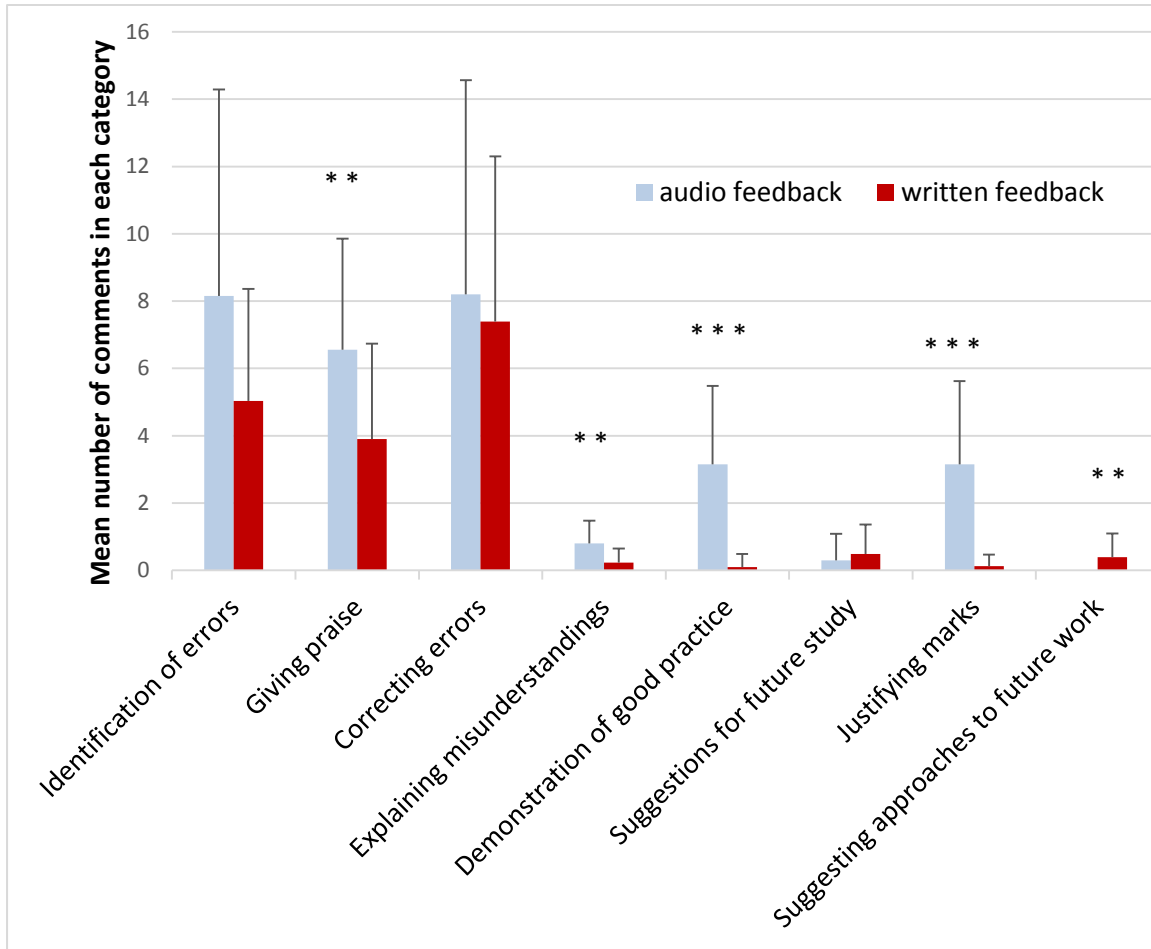


Figure 4. Comparison of the types of comments used in samples of audio versus written feedback. The bar graph shows mean number of comments in each category with error bars indicating standard errors of the mean.

A comparison of the number of comments made showed significantly more comments made using audio feedback, indicated by the asterisks, under the headings ‘giving praise’ ($p=0.006$), ‘explaining misunderstandings’ ($p=0.0025$), ‘demonstration of good practice’ ($p<0.0001$), and ‘justifying marks’ ($p<0.0001$). The only category in which more comments were made using audio feedback than written, was under the heading ‘suggesting approaches to future work’ for which written feedback gave significantly more comments than audio ($p=0.008$), although the mean number of comments in this category was very low.

Student evaluation

Responses were received from 21 students who received written feedback and 16 who received audio feedback. Students had broadly similar opinions on a number of issues, for example a majority in each group felt that their feedback was a mix of positive and negative comments. A majority in each group also agreed that the feedback gave suggestions as to how they could improve in the future. However, only 52% of the written feedback group, and 50% of the audio group felt that the feedback justified the marks awarded.

81% of the audio feedback group agreed that their feedback was clear and easy to follow, compared to 47% in the written group. Comments offered by a student in the ‘written feedback’ group give one reason for this:

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'writing should be readable; I have trouble reading peoples writing so I would prefer to have my feedback audio.'

There were positive comments about both types of feedback:

'referred audio feedback, more detailed, gave more information, explained better where I had gone wrong and what I needed to improve on' (audio).

'I liked how it went through step by step and explained everything' (written).

Staff evaluation

Comments from the four members of staff who responded to the evaluation, indicated mixed views about using audio feedback. One member stated that they would like to continue using audio feedback, but that it depended on the assessment type and on the number of scripts. Another felt that the benefit of giving written feedback was that they were able to give an example of how e.g. a graph should look, which wouldn't be possible using audio feedback.

The time taken to give the feedback was an issue for one participant who found that they had to produce written feedback before they could produce an audio file, hence doubling the time taken. There was one comment relating to the depth of feedback given with the audio files:

'the temptation with written feedback is to make it short.'

Discussion

In its simplest form, feedback might be seen as a way to improve performance and grade. This study did not find a quantifiable difference in the outcome of test results following different formats of feedback given, whether written or audio feedback. The authors acknowledge that a selection of questions in an on-line test is not a powerful tool for assessing learning, and it would be surprising to see a difference made simply due to the format of feedback, nevertheless, we feel this was a valuable exercise to undertake. In addition, the follow up marks in semester 2 for the laboratory report might be seen as an indication of learning from feedback in semester 1 since the assessment types were similar, but again, it would be surprising to have found a significant effect due to the format of feedback. This is in line with the work by Macgregor *et al.* (2011) who found no significant effect on learning gains amongst Business Management and Information students who had access to either formative audio feedback, or written feedback. Gleaves and Walker (2013) present a similar picture from their study which compared formative audio and written feedback, on the outcome of essay writing amongst students studying for a BA Education. These authors found no significant differences in 'knowledge elaboration' (the process of using prior academic and personal knowledge to refine and construct new material) in essay construction, between two student groups, one which received written formative feedback, the other audio feedback in the form of audio files. The group receiving audio feedback commented on the greater "richness" provided (a finding of many studies into audio feedback, Merry and Orsmond, 2008; Lunt and Curran, 2010; Gould and Day, 2012) but the researchers identified this as relating to feedback in the form of confirmation and reassurance to students, rather than in promoting continual improvement.

The students who signed up for taking part in this study may well have been students who were more interested and engaged with the topic, and this might explain the reason for the significant differences between the marks awarded for coursework amongst the 'audio' group (53.1%) and the students who did not take part in the study (46.1%), although there was no significant difference between those receiving written feedback (51.1%) and the remaining cohort. Students were randomly assigned to the different groups, and it might be that the higher mark reflects a tendency

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for tutors to be more generous when giving audio feedback. A trial of marking students' work "face to face" found that staff gave significantly higher marks to these students than to their peers who received written feedback (Chalmers *et al.*, 2013).

The analysis of the language used was undertaken using a similar tool to that described by Merry and Orsmond (2008), based on guidelines produced by Brown *et al.* (2003). Whilst our findings are not directly comparable due to differences in methodology, in the category of 'demonstrating good practice' our results are in line with Merry and Orsmond (2008) who also found that audio feedback gave significantly more (in terms of word count) than written feedback. The amount of feedback given by audio files is clearly greater (see mean word counts), but does more feedback mean better feedback? Elder and Brooks (2008) investigated the effect of 'simple' or 'elaborate' feedback on exam performance amongst graduate nursing students and found that whilst some feedback was better than none, the extent of feedback given did not affect performance. Students performed worse in a later exam, in subjects on which they had previously been tested and had received elaborate feedback, performing better in subjects which had previously been tested and on which they had only been given minimal feedback. The authors concluded that the minimal feedback had promoted deeper engagement with the topic and therefore a better long term outcome in terms of learning.

Of the 37 students who responded to the questionnaire, only 50% of the audio group felt that the feedback justified the marks awarded (52% for the written group), despite the category of feedback labelled 'justifying marks' providing more feedback using audio files, than with written feedback. Staff in Higher Education spend much time in marking work and providing extensive written feedback for students, but there is clearly a mismatch between what staff think is provided (Bailey and Garner, 2010; Price *et al.*, 2010), and what the students think they receive, as consistently poor student surveys show (HEFC, 2012). Weaver's study (2006) into the students' perceptions of feedback indicates the aspects which they do not find helpful as being; vague comments, feedback lacking guidance or focused on the negative, and feedback unrelated to assessment criteria. Likewise, Ferguson's study (2011) identified that what students (undergraduate and post graduate) value most in the feedback they receive are positive, clear and constructive comments which guide them to future improvements. Lizzio and Wilson (2008) also investigated student perceptions of feedback; students identified the most effective feedback as being 'developmental', i.e. that which could help towards development in future work. In our study, feedback categorised under 'suggesting approaches to future work' which might be deemed as 'developmental', did not feature strongly in either audio or written feedback. This was also the case in the study by Merry and Orsmond (2008).

Whilst the study did not specifically set out to explore staff views towards using audio feedback, the comments received are in line with those of Chiang (2010) and Gould and Day (2012) in that there were very mixed views about using audio feedback and the possible increase in workload for them. However, Lunt and Curran (2010) found the tutor experience of using audio feedback to be more positive, with two tutors finding that audio feedback took much less time than writing for a 2000 word coursework. This may reflect different types of work being assessed; the comment by one member of staff in our study, regarding the appropriateness of using audio feedback to explain 'how a graph should look'[echoes those of Chiang (2010) who identifies that assessors should match the type of feedback not only to the assessment, but also to the learner. This obviously becomes important in the case of students with hearing difficulties or for students whose first language is not English.

What does this study tell us about audio feedback and how this relates to good practice? There is now plenty of evidence that many of our traditional methods of giving feedback to students are

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putting an increasing burden on staff (Bailey and Garner, 2010) and yet are either not working (Price *et al.*, 2010), or are not perceived as being helpful (Weaver, 2006; Lizzio and Wilson, 2008). Audio feedback has the potential to fulfil some of the criteria for good feedback, namely timeliness (it can be quicker to get the feedback to the student); in giving more detail to the student without increasing the marking burden (Lunt and Curran, 2010), and in making feedback personal (Gould and Day, 2012). Students are also receptive to this type of feedback and are much more likely to listen to it than to read written feedback (Lunt and Curran, 2010). Resistance by staff may be reduced with the emergence of quick and easy to use software for personal computers, tablets and phones making it easier to use audio feedback if they so wish, without feeling an added burden of dealing with 'difficult' technology. In this, and other studies, the effectiveness of audio feedback, has not shown to be any more effective than using written feedback, (Macgregor *et al.*, 2011; Gleaves and Walker, 2013), and it might be that the type of work being marked will to a large extent determine the best format for giving feedback. The principles of being positive, consistent in linking feedback to assessment criteria and in focussing on future improvement relate to any form of feedback.

Acknowledgements

This study was made possible by funding from the Edinburgh Napier Teaching Fellows teaching development grant.

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