Exploring the efficacy of audio email feedback in information management assessment (ExAEF project): final report

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Abstract (100 –150 words)

Formative assessment generates feedback on students' performance, thereby accelerating and improving student learning. Anecdotal evidence gathered by a number of evaluations has hypothesised that audio feedback may be capable of enhancing student learning more than other approaches. A quasi-experimental study employing qualitative techniques for triangulation was conducted to formally evaluate the efficacy of formative audio feedback on student learning in a web technologies module. We focussed on the delivery of 'voice emails' to undergraduate students (n = 66) and attempted to evaluate the efficacy of such feedback in formative assessment and ergo students' learning, as well as achieving a better understanding of students' feedback behaviour post-delivery. The results indicated that audio feedback better conforms to existing models of 'quality' formative feedback as defined by the pedagogical research, can enhance the student learning experience and can be more efficient in feedback delivery. Despite this and high levels of feedback re-use by student participants, the audio treatment group underperformed in learning tasks when compared to the control group. The benefits to be gained when using audio feedback has led to its wider adoption within information and computer science teaching practice and greater use of formative assessment in taught modules.

Aims

The research was framed around a series of hypotheses which translated to the following aims:

- Evaluate the efficacy of audio feedback in delivering formative feedback for information management assessment. In particular, exploring the proposition that audio feedback is more effective than written feedback in producing improvements in student learning and assessment scores;
- Assess the degree to which audio formative feedback meets recognised models of 'quality' formative feedback, as proposed by Gibbs and Simpson (2004) and Nicol and Macfarlane-Dick (2006);
- Determine whether delivering audio feedback (via 'voice emails') is more time efficient for ICS teaching staff to create and deliver to students, thereby promoting greater use of formative assessment and increased conformance to established pedagogical practice;
- Determine student feedback preferences. Do students reveal a preference for receiving 'voice emails' over other feedback methods?

A significant supplementary aim of the research included developing an improved understanding of students' use of audio feedback, e.g. listening habits, how they use it, the role of feedback portability, whether students refer to audio feedback more often, etc.

Outcomes

The ExAEF project arrived at an improved understanding of the efficacy of audio feedback technologies (i.e. 'voice emails') in information management formative assessment strategy. This outcome is significant owing to the limited investigations which existed prior to project initiation and the applicability of the findings outside the ICS domain. Specifically this has resulted in:

- Verification that audio feedback can better meet theoretical models of quality formative feedback as posited by the pedagogical literature;
- Greater adherence to 'good' pedagogical practice within the Information Management & Systems team through greater use of formative assessment strategies, made possible by the positive evaluation audio technologies in formative feedback delivery;
- Enhancements in the student learning experience, owing to the greater use of formative assessment and the benefits that audio feedback can afford;
- The achievement of all project deliverables;
- Interest and implementation of ExAEF project techniques outside the Information Management & Systems group at LJMU in other departments (see dissemination outcomes below).

A significant outcome of the ExAEF project constituted dissemination activity. Upon receiving confirmation of project funding, the project team took the opportunity to collect pilot data from an additional (but similar) cohort studying the same test module in semester one. This data collection was conducted during the final weeks of semester one (2009). This has enabled the project team to gather extra data to bolster final conclusions, but has also afforded the project team an opportunity to refine the methodology and to engage in additional dissemination activity with a variety of datasets. Dissemination activity (listed below) has assumed the form of peer reviewed publications (3, 4), workshops (5, 6), presentations (1, 2, 8) and webinars (7).

1. Spiers, A. & Macgregor, G. (2009), Using audio email feedback in formative assessment, *Audio Feedback: A Word In Your Ear Conference* 2009, 18 December 2009.
2. Macgregor, G., Spiers, A. & Taylor, C. (2010), Role of audio email feedback in improving student learning: preliminary findings of the ExAEF project (Keynote presentation), *LJMU Learning & Teaching Conference 2010*, 20-21 April 2010, Liverpool John Moores University.
3. Macgregor, G., Spiers, A. & Taylor, C. (2010), Exploratory evaluation of audio email technology in formative assessment feedback, *ALT-J, Research in Learning Technology*. ***Currently under peer review****. (Pre-print to made available on project website in due course)*
4. Macgregor, G., Spiers, A. & Taylor, C. (2010), Investigating 'voice email' technology efficacy in information management assessment, *11th Annual Higher Education Academy Subject Network for Information and Computer Science Conference*, University of Durham. ***Currently under peer review****. (Pre-print to made available on project website in due course)*
5. Spiers, A. (2010), Audio feedback, 'Audio Feedback and Wimba Live Classroom', *Media Enhanced Learning - Special Interest Group Event*, 21 April 2010, University of Sunderland.
6. Spiers, A. (2010), Enhancing student feedback with Wimba voice emails, *International Wimba Day 2010*, Coventry University Technology Park, 14 May 2010, Coventry.
7. Spiers, A. & Macgregor, G. (2010), "It's as if the student is in front of you" - Using Wimba Voice Email for feedback on formative assessment, *Wimba Study Break Webinar*, 16 June 2010.
8. Macgregor, G. & Spiers, A. (2010), Enhancing the student learning experience: Evaluating the impact of voice email technology in formative assessment strategy, *School of Sport and Exercise Sciences 'away day'*, Liverpool John Moores University, 18 June 2010, Blackburne House, Liverpool.

Dissemination materials are available via the ExAEF project website.

It is noteworthy that dissemination activity has been both local and international in nature. Project team members delivered a project related presentation as a 'keynote' speech at the annual LJMU Learning & Teaching Conference (2), attended by 300 lecturers and support staff from across the University, and presented at the LJMU School of Sports Science 'away day' (8). Both sessions have informed local assessment practice outside the Information Management and Systems group at Liverpool Business School and ExAEF team members are now assuming a consultatory role for lecturers wishing to deploy such technology in their teaching practice. As a consequence of the positive ExAEF project results and the links project staff have with the LJMU Learning Development Unit (LDU) (http://www.ljmu.ac.uk/lid/development/), an audio feedback 'advocacy and promotion' programme (led by the LDU) has been initiated as a means of improving feedback quality to students across the institution.

International dissemination has been achieved via published peer-reviewed outputs (3, 4), but also through an international webinar held as part of Wimba's periodic 'study break' webinars. The webinar was well attended attracting over 250 delegates, the majority of which resided outside the UK.

Additional dissemination has been provided by Teresa MacKinnon (Language Centre, University of Warwick) who has been conducting similar research and who - by agreement - publicised ExAEF project findings during her session at the Teaching and Learning Showcase 2010, University of Warwick, 8 July 2010 (http://www2.warwick.ac.uk/services/ldc/tlshowcase/programme/learnspace1/).

The ExAEF project has also attracted attention from the learning technology blogosphere:

- Telic blog (University of Southampton): http://telic.wordpress.com/2010/06/08/audio-feedback-on-assignments/

Methodology

The study participants were drawn from a first year cohort studying the BA (Hons) Business Management and Information (BMI) and the BA (Hons) Business and Public Relations (BPR) degree courses and Liverpool John Moores University (LJMU). The BMI degree course provides students with typical business skills, but is peculiar in its emphasis on technology and information in business, particularly in areas pertaining to web technologies, e-business, information systems and management. The BPR degree course employs less IT than the BMI course; nevertheless, students on this degree still acquire a variety of skills and competencies in web technologies, social media, and media production in order to contribute meaningfully within the growing online PR industry.

The study was conducted during semesters one and two of the academic year 2009/2010 for a module on web technologies (LBSIS1036 Business Information Management). BMI students studied the module in semester one; BPR students in semester two. A total of 66 students agreed to participate in the study. A £30 Amazon voucher was raffled within BPR student cohort in order to improve participation.

To deliver audio email feedback Wimba Voice 6.0 was installed within Blackboard. Wimba Voice (http://www.wimba.com/products/wimba_voice) is a web-based tool capable of being bolted onto a variety of VLEs and provides a series of audio tools. Wimba Voice enables the creation and delivery of 'voice emails'. These are essentially voice messages which can be recorded and communicated with students using a familiar email / tape recorder interface, all within a Java enabled web browser. Use of voice emails obviates MP3 file size issues normally associated with email delivery (Merry and Orsmond, 2008) as the audio file is instead saved to a local server. The recipient of a voice email is simply provided with a hyperlink to follow and then invited to stream the audio within a web browser or download the message. Wimba voice emails also enable students to reply with their own voice emails in much the same way that a reply might be sent to a conventional email. The importance ascribed to fostering a student-tutor dialogue in formative feedback has been well noted in theoretical

work (Nicol and Macfarlane-Dick, 2006) and its use in the ExAEF project was an attempt to control for a recognised limitation of audio feedback approach. It should also be noted that the majority of IT labs used by the cohort are equipped with headset microphones as standard.

The summative assessment for the course module required the submission of an XHTML report. The module design was modified to incorporate a formative assessment point mid-way through the semester, entailing the submission of an XHTML report plan, thus providing tutors with feedback on student learning progress and their understanding to topics covered.

In order to control for varying levels of student ICT efficacy between the BMI and BPR cohorts, and any variations within cohorts, a pre-test orientation session with Wimba Voice was delivered to all students the week prior to formative feedback delivery. This session covered how to access voice emails, download them and reply to them. A demonstration video was also created and posted (via YouTube) on the relevant module section of Blackboard. Since voice email was likely to be deployed after the ExAEF project concluded, all students received the orientation. After submitting their formative assessment, students were then randomly streamed into two feedback groups: a written group (control) (n = 33); and a voice (email) group (treatment) (n = 33).

Module tutors agreed marking criteria to assess students' formative submissions and, where possible, attempted to incorporate aspects of Nicol and Macfarlane-Dick's (2006) seven principles of good formative feedback. In line with formative feedback practice, no marks were attached to students' formative assessment submissions. For the purposes of the research, however, a mark was recorded but remained undisclosed to students. Tutors' marks were based on the agreed marking criteria.

Students streamed into the treatment group received voice email feedback; students streamed into the control group received their feedback as an MS Word file email attachment. All feedback was delivered to students within a week of the original formative assessment submission. The required length of time taken to generate and deliver feedback was recorded by tutors. This was measured from the moment the tutor began perusing the submission to the very end of feedback creation process (i.e. delivery to the student) so as to accommodate the total time which a tutor might invest in providing formative feedback.

Students were required to submit their summative assessment (XHTML report) in the final week of the semester. Summative assessment submissions were marked, moderated, and written feedback delivered to all students. Student performance in the summative assessment was recorded for subsequent analysis.

Student participants in both the control and treatment group received a web-based survey instrument designed to elicit data pertaining to feedback attitudes, initial use, reception and effect on learning. The survey was distributed to students one week after formative feedback was delivered and was administered during an IT lab session. To determine how well formative feedback achieved its purpose and to detect effect of formative feedback on student learning, the design of section two of the web-based survey instrument was informed by Nicol and Macfarlane-Dick's (2006) feedback model and the feedback conditions proposed by Gibbs and Simpson (2004). Students were required to indicate their responses to a series of statements using a five point Likert scale, ranging from 'strongly agree' (5) to 'strongly disagree' (1). These statements mapped to the above noted models. Sections one and three of the survey instrument captured demographic data and descriptive data on the extent of the formative feedback use, student ICT access and device ownership and use, and feedback preferences.

Semi-structured interviews were conducted with a sample of the student participants in the final week of each semester (n =20). These interviews were designed to gather rich data on audio feedback use, perceptions and to better understand the role of formative audio feedback on student learning. Interviews were administered by a member of the research team uninvolved in module teaching. Interviews were sound recorded, transcribed and then uploaded into QSR NVivo 8 for content

analysis, coding and subsequent analysis. Open coding was undertaken using Holsti's (1969) methodologies for content analysis and category creation, an outcome of which was the coding taxonomy / model deliverable.

All research instruments were subject to scrutiny by the LJMU Research Ethics Committee, which approved the instruments and methodology after adjustments were made to ensure no student was academically disadvantaged by participating in the study.

Deliverables

In addition to the ExAEF project outcomes listed above, all deliverables were met. Deliverables include:

- Project website (http://www.staff.ljmu.ac.uk/bsngmacg/exaef/) dedicated to publicising ExAEF project results, providing wider access to project news, documentation and deliverables, and expediting access to 'open access' (i.e. pre-print) versions of all dissemination materials. Note: A journal and conference paper are currently under peer review and will be posted on the project website as soon as they become available.
- Specially designed web survey instrument for eliciting data pertaining to student feedback preferences.
- Mid-term report covering research progress and interim results.
- Conceptual model / coding taxonomy of factors affecting student audio feedback preferences and learning behaviour.
- Case study example of how audio feedback was embedded within a basic web technologies module, including sample formative assessment submission and formative audio feedback delivered.
- Guidance on optimising feedback content when delivering formative assessment feedback using audio technologies.
- Final report with summary of findings.

It is anticipated that ICS tutors/departments interested in deploying audio technologies in assessment practice will consult the ExAEF case study example and the audio feedback guidance to inform - and maximise the impact of - their local implementation. Those concerned with reflective pedagogical practice can use the web survey instrument to evaluate the success of their audio feedback within a diverse range of ICS topics. Also useful to the ICS community is the ExAEF project website which, aside from providing access to the above noted deliverables, also provides:

- Links to dissemination activity, containing detailed analyses of the technical and pedagogical merits of audio feedback;
- A model which can be used to orientate practitioners of the variables to be cognisant of when embedding audio feedback into curricula.

All deliverables are also likely to find an audience outside the ICS community.

Background

The importance of formative assessment in promoting student learning is well recognised within pedagogical communities of practice (Gibbs and Simpson, 2004) and continues to be noted by researchers (Nicol and Macfarlane-Dick, 2006). Formative assessment is specifically intended to produce feedback on student performance thereby improving and accelerating learning. 'Surface' approaches to learning which often characterises other assessment approaches is therefore discouraged and increased learning can be achieved. Despite the importance ascribed to formative assessment, very few formative assessment opportunities are generally made available to students in higher education (Yorke, 2004). A commonly cited reason for this is the limited time lecturers have

within semester-based systems to produce and deliver the feedback necessary to affect changes in student learning behaviour, often within increasingly large student cohorts (Ibid.). For 'formative learning' to occur and the benefits of formative assessment to be achieved, feedback needs to timely, relevant, detailed and delivered to students prior to summative assessment (Gibbs and Simpson, 2004). Ameliorating the above stated problems formative assessment strategies provided the initial motivation behind the ExAEF project.

In this research we aimed to explore the use of audio email feedback as a means of delivering detailed formative feedback to students and to evaluate its efficacy. In particular, we focused on the deployment of Wimba Voice to deliver formative feedback as 'voice emails' to level one undergraduate students studying the LBSIS1036 Business Information Management module at LJMU. The use of such technologies in formative feedback at higher education generally remains an under researched area, and whilst anecdotal evidence suggested it could be useful in learning (Bird and Spiers, 2009; Sipple, 2007), few formal evaluations had (at time of proposal submission) been undertaken, nor was there understanding of how well the audio format could meet feedback expectations. Student perceptions and use of formative audio feedback was also not well understood.

The ExAEF project was therefore principally concerned with evaluating the role of formative audio feedback in improving student learning and its efficacy as a feedback format, but also exploring student perceptions of feedback delivered via such technologies and better understanding how this audio feedback was used after its delivery to students (e.g. differences in audio feedback use when compared to written feedback, does the format of the feedback stimulate its portability and further use?, etc.). The research also provided an opportunity to formally evaluate anecdotal work conducted locally by Spiers and Bird (2009).

Putting it into Practice

Core deliverables of the ExAEF project were to produce guidance on using audio approaches to deliver formative feedback and an assessment case study. These are available from the project website and provide significant detail on how best to optimise audio feedback delivery and how it can be best integrated within information management module curricula. For further details visit: http://www.staff.ljmu.ac.uk/bsngmacg/exaef/deliverables.html

Embedding

Our quasi-experimental study compared the efficacy of audio and written approaches to formative feedback delivery and introduced the use of 'voice emails' as a means of delivering formative feedback to students undertaking a web technologies module. Results from all research instruments indicated student satisfaction with all formative feedback delivered, irrespective of whether it was in audio or written format; however, data suggested an increased preference for audio feedback. The results indicated that voice emails better met recognised theoretical models of quality formative feedback thus enhancing the student learning experience. A specially designed survey instrument included a component designed to map to formative feedback models (e.g. Gibbs and Simpson, 2004; Nicol and Macfarlane-Dick, 2006) and voice emails were found to be significantly more detailed, better clarified assessment expectations, were easier for students to understand and interpret, and often inspired motivational beliefs. Some differences were found in the results attained between the cohorts used for study (see Methodology section for participant details). Merged data for this aspect of the survey instrument is provided in Table 1.

Extensive qualitative data gathered from participant interviews corroborated results from other instruments, the analysis of which generated a detailed coding taxonomy / model. Students reported positively on the detail and clarity of voice email feedback, and on the personal nature of voice emails and their ability to emulate face-to-face meetings with module tutors. Voice emails were also found by many students to be more conducive to their study and learning behaviour. Data from dyslexic students also suggested that audio feedback ameliorated issues associated with decoding written text.

The qualitative data also assisted in developing a clearer understanding of students' feedback use behaviour. Student participants were more inclined to re-use audio feedback after delivery. An interesting outcome of the research was the student preference for not downloading feedback to mobile devices. The majority of participants preferred to leave their voice email within their email software and revisit for in-browser streaming when necessary. Even those students that saved the feedback did so to their laptop or their LJMU networked drive, and not to a mobile device. This finding was perhaps most intriguing owing to the ICT-literate nature of the student cohorts involved. Indeed, even students favourably disposed to audio feedback remarked on the lack of flexibility occasionally afforded by audio approaches. For example, a small number noted the difficulty in 'referring back' to feedback while engaged in another learning task at the library (e.g. easier to refer to written feedback while in the library instead of having to log on to a computer terminal to access the audio feedback). Given the almost universal mobile device ownership of the participants, it is puzzling that students preferred not to download feedback to obviate such inflexibility. Although the response of students to audio feedback was overwhelmingly positive, a small number of students did note a preference for written feedback. These students reported finding it easier to assimilate feedback guidance in a textual form, although all conceded that they could easily have created their own written notes from the voice email delivered.

Survey statements – section two	**Voice email (n = 33)**		**Written (n =33)**		***U***	***Z***	***p*-value[a]**
	M	***Mdn***	***M***	***Mdn***			
a. I was satisfied with the feedback provided	4.386	4	4.095	4	515	-0.533	0.594
b. I found the feedback to be clear and understandable	4.286	4	4.095	4	485.5	-0.974	0.330
c. The feedback I received helped me 'troubleshoot' or self-correct my performance on the module and the final assessment	3.952	4	3.762	4	472	-1.057	0.291
d. The feedback clarified or made explicit what is required of me in order to improve my academic performance on the module and the final assessment	4.238	4	3.762	4	486.5	-0.822	0.411
e. The feedback helped me reflect on my learning	3.809	4	3.714	4	491	-0.746	0.456
f. The feedback helped me understand where to focus my efforts so that I can better improve my university coursework	3.905	4	3.905	4	541.5	-0.046	0.963
g. I considered the feedback to be sufficiently personal and relevant to me	4.238	4	3.905	4	400	-2.104	0.035*
h. I found the feedback to be easy to comprehend	4.19	4	3.809	4	414	-2.184	0.029*
i. I felt the feedback was sufficiently detailed	4	4	3.619	4	418.5	-1.794	0.073
j. I found the feedback to be too brief †	2.476	2	2.905	3	388	-2.126	0.033*
k. The feedback was cryptic or difficult to interpret †	1.809	2	2.476	2	314	-3.292	0.001**
l. The feedback helped to increase my interest in the module I am studying	2.952	3	2.905	3	472.5	-1.010	0.312
m. I felt motivated after reading/listening to my feedback	3.905	4	3.238	3	444	-1.363	0.173
n. The feedback was delivered in a timely fashion	4.095	4	4.286	4	518	-0.390	0.697
o. I intend to use the tutor feedback later in the module	4.334	5	3.952	4	418.5	-1.839	0.066
p. I was afforded sufficient opportunity to seek follow-up tutor feedback (e.g. Questions)	3.524	4	3.667	4	491.5	-0.759	0.448
q. It is important that my feedback is delivered electronically	3.667	4	3.619	4	524.5	-0.271	0.786
u. I prefer to receive my feedback electronically	3.523	4	3.905	4	513	-0.431	0.667

[a]Two-tailed Mann-Whitney U test (adjusted for ties). Sig. at $p < 0.05$.
* $p < 0.05$
** $p < 0.01$
† Statement reverse coded.

Table 1: Measures of central tendency and M-W U tests between groups for section two of survey instrument.

Analysis of students' assessment performance suggests that although audio feedback (voice emails) may enhance the student learning experience, it may not significantly improve student learning. No significant differences could be found between the assessment performances of treatment or control groups ($t(64)$=-0.154, p=0.878).

The tutor process of producing and delivering voice email feedback was found to be almost 40% quicker than written feedback. This was an encouraging finding as it appears to reduce the time commitments required for formative feedback creation thereby promoting greater adherence to 'good' pedagogical practice by ICS (and other) departments (i.e. that students should enjoy more formative learning opportunities at higher education). As outlined in the *Background* section above, a principal motivation behind this research was to improve pedagogical practice within ICS departments by exploring efficient and effective ways of delivering formative assessment and, specifically, formative feedback. Although formative assessment is considered important in student learning, few 'formative learning' opportunities are generally made available to students in ICS departments. Structural constraints, such as large student cohorts, limited time within semester-based academic calendars and the demands of scholarly activity, generally limit its use. Delivering formative feedback in the ExAEF project was found to be significantly quicker and more effective using audio technologies than delivering feedback using written methods. Providing formative learning opportunities to ICS students is thereby rendered more feasible since the delivery of formative feedback is significantly quicker. The wider deployment of such audio approaches to formative feedback can therefore be considered self-sustaining.

Further analyses of project data are available in the ExAEF project dissemination materials.

Significant detail on how the technology was embedded within the module curriculum is provided in the assessment case study deliverable, available from the ExAEF project website at: http://www.staff.ljmu.ac.uk/bsngmacg/exaef/deliverables.html.

Benefits

The principal benefit of the ExAEF project to other ICS departments is validation of audio feedback approaches in information management assessment strategy. Other departments also have the opportunity of benefitting from the project deliverables, particularly the 'Case study example' and 'Guidance on optimising feedback' deliverables, should teaching staff wish to use the same techniques in their teaching practice.

Students Views

Canvassing student views on the use of the technology was integral to the project. Student views were therefore explicitly considered in the project methodology using two methods: a specially designed survey instrument (also constituting a project deliverable), and; semi-structured interviews with students (n = 20). Data gathered from the semi-structured interviews were analysed using qualitative data analysis techniques. Further details of these instruments are available in the *Methodology* section. Findings from the project data have informed the 'Guidance on optimising feedback' deliverable.

Impact

Since the ExAEF project was focussed on evaluating the impact of audio feedback on student learning, the impact of the project is considered in detail within the *Embedding* section (above). It is nevertheless possible to summarise its impact as follows:

- Voice emails (audio feedback) better met recognised theoretical models of quality formative feedback thus enhancing the student learning experience. In particular, voice emails provided formative feedback which was:
    - More detailed;
    - Easier for students to interpret and understand;
    - Better at clarifying assessment expectations;
    - Better at establishing a personal relationship with the student;

- Use of voice emails promoted greater feedback re-use by students prior to summative assessment submission.

Issues and Debates

What are the key technologies and/or software required to deliver a basic level of audio feedback?

A preference should be made for a fully integrated browser-based software solution (e.g. Wimba Voice). Such tools streamline the feedback delivery process by enabling teaching staff to record, send, attach text (if necessary), and archive audio feedback all within a single browser window. It also obviates file attachment issues which can arise from such large MP3 file sizes, file transfer difficulties, and facilitates student-tutor dialogue. Students also reported positively on the flexibility afforded by such approaches (e.g. enabling greater flexibility in audio playback, streaming, download, etc.).

Where integrated solutions are not possible, freely available audio software can be used to record and edit audio files (e.g. Audacity). Audacity is a free audio editing tool that is cross platform and can be downloaded from http://audacity.sourceforge.net/. Ensure the LAME encoder is downloaded in order to save as MP3, which is available at http://audacity.sourceforge.net/download/windows.

Today, the vast majority of mobile phones have the ability to record voice, although not all record using as MP3, widely considered to be the most 'universal' audio format. This widespread adoption of technology has the potential to enable teaching staff to record feedback flexibly.

The ExAEF project focussed on formative audio feedback. How feasible is it to use audio feedback in summative assessment?

It is feasible to use audio feedback in summative assessment, although protocols must be implemented to ensure all feedback is appropriately archived for distribution to second markers and external examiners. There is also a requirement for feedback creation to be more structured and to relate explicitly to the marks assigned to each component of the assessment task (i.e. students need to be clear on the marks achieved in the marking criteria and this needs to be explicitly articulated during feedback creation). The JISC funded Sounds Good project has recently produced a 'practice tips' document which summarises such practical issues in summative assessment practice (Rotheram, 2009).

Will the use of formative audio feedback improve the learning and academic performance of my students?

That formative audio feedback significantly enhances the student learning experience, improves their opportunities for flexible learning, and promotes good pedagogical practice is clear. However, the issue of whether audio feedback can better affect improvements in student learning remains unclear. Sipple's (2007) research found audio feedback to positively influence student motivation and revision behaviour, self-confidence, and student-tutor relationships, leading Sipple to conclude that audio feedback improves overall student learning, a logical conclusion based on improvements in revision behaviour and the possible benefits this is likely to engender in student learning. An aim of the ExAEF project was to test this assumption. Whilst a high level of feedback re-use was recorded by student participants, the academic performance of the treatment group was not significantly different. Issues of project funds prohibited extensive data gathering instruments to be proposed in the ExAEF bid for this aspect of the project. It is acknowledged that the metrics used instead were sufficient to detect differences between groups but were too crude to *understand* the relationship between audio feedback and improved student learning. It is therefore necessary for future research to better consider the level of student engagement prior to formative assessment submission and to improve

our understanding of students' study behaviour in the weeks and months prior to summative assessment submission.

Resources

HEA Subject Centre for Information and Computer Sciences Development Fund resources:

- ExAEF project website: http://www.staff.ljmu.ac.uk/bsngmacg/exaef/
- ExAEF project deliverables (including 'Case study example', 'Guidance on optimising feedback', 'Web survey instrument' and other project deliverables): http://www.staff.ljmu.ac.uk/bsngmacg/exaef/deliverables.html

Websites:

- 'A word in your ear' – Audio Feedback Conference 2009: http://research.shu.ac.uk/lti/awordinyourear2009/

Software

- Wimba Voice: http://www.wimba.com/products/wimba_voice
- Audacity: http://audacity.sourceforge.net/

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