Case Study

Using audio technology for student feedback

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Abstract

This piece of research explored of the use of audio within emerging technologies to support enhanced learning, assessment and feedback for Industrial and Product Design students. The methods used and outcomes of this exploratory project are discussed and a view of the role of audio in developing effective learning, assessment and feedback strategies is offered. A number of examples of the use of audio during the project are presented. The development of robust guidelines for using audio technology is discussed, as is integrating its use into existing automated systems.

Keywords: Audio technology, assessment and feedback, case study

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1. Background

Giving feedback to students is an integral component of the higher education teaching and learning system. Feedback enables staff to explicitly guide students in their study; to enhance student motivation; enhance student learning; enhance student reflection and for clarification [1]. Despite the vast amounts of time staff currently spend providing feedback for students, it is not always an effective means of promoting learning [2]. In order to develop more effective methods of providing students with useful feedback a number of higher education establishments have started to investigate the use of audio feedback, with positive results [2][3][4][5]. As part of the JISC Users and Innovations programme the Higher Education Academy Engineering Subject Centre is working with the Department of Design and Technology at Loughborough University to explore the use of audio within emerging technologies to support enhanced learning, assessment and feedback for Industrial and Product Design students. Audio technologies can be used in a number of ways within education. In the context of the Department of Design and Technology there was an interest in investigating it's use for the following:

- in the assessment of large drawing folios
- in the assessment of large groups of students
- providing audio podcasts to groups via the University's intranet system
- recording lectures, seminars and tutorials.

The project was supported by experts from two current audio projects, also funded by JISC; the *Sounds Good* project (who also acted as technical consultants for the project) [6]; and the *Audio Supported Enhanced Learning* project [7].

2. Methodology

The project commenced with a workshop led by Bob Rotheram from the Sounds Good project [6] based at Leeds Metropolitan University. The workshop was attended by seven members of staff in the Department and gave an overview of audio marking, including benefits, how students can access files and structuring audio feedback. Following the workshop four Sony ICD-UX70 MP3 voice recorders were purchased. The MP3 format was specifically selected as it has many advantages. The small file size created when the feedback is recorded means the files do not need to be transferred into a smaller format. It also gives students the choice to download the files onto a number of devices – their PC or laptop, MP3 player, mobile phone, PDA and many more.

Between October 2008 and March 2009 the researcher investigated the use of audio feedback through two pilot studies. These pilot studies involved audio-recording comments on students'

coursework and delivering the feedback through email. Data was gathered by holding focus groups with students after they had received audio feedback. A number of smaller trials were also carried out during the project, including posting audio files of lectures, tutorials and seminars.

Pilot study one

For the first pilot study audio feedback was given to 11 first year undergraduate students as part of a 'Design Contexts' module (module 08DTA003). As part of the submission students were required to write an individual essay describing the differences between industrial design and engineering, drawing on their own experiences. The feedback for their essay was given as written feedback as well as each student receiving an audio file via email, this was to ensure these students received the same summative feedback as their peers to ensure no detriment to their studies.

Pilot study two

The second pilot study utilised a module submission for first year undergraduates for a 'Design Practice' module (module 08DTA001). In this module students were required to submit a group drawing folio which contained research and analysis for a product semantic/form investigation exercise. The 11 students who took part received their feedback on audio via email. As this feedback was formative students were not given any other form of feedback.

Data gathering and analysis

The two pilot studies were conceived to investigate the drivers and barriers to the use of audio technology within the Design Department and to explore its possibilities. There were two main research questions: is audio technology appropriate for improving learning and giving feedback on student design projects? and can it be integrated with LEARN (Loughborough University's intranet system)?

In order to investigate whether audio technology is appropriate for improving learning and giving feedback on student design projects, a focus group was developed. It focused on investigating student experiences of audio feedback during pilot studies one and two as well as asking general questions about audio feedback. A focus group methodology was selected as it would provide in-depth feedback from students. The focus group aimed to understand how students felt about audio feedback, if they could use audio feedback effectively, what elements of audio feedback they either liked or disliked and which they preferred between audio feedback and traditional written feedback. The focus group was attended by six of the 11 first year students that took part in pilot studies one and two. During the focus group the following questions were asked:

Pilot study one: Design Context Essay

1. Did the file take long to download?
2. Could you open the file?
3. Were there any issues in listening to the file?
4. What media did you use to listen to the file (computer/mp3)?
5. Did you have your essay in front of you when you listened to the file?
6. Was my voice clear and easy to understand?
7. You received both audio and written feedback, which did you prefer, why?
8. Which feedback was more clear?
9. Which approach was more clear/most in-depth?
10. Which approach did you feel was more personal?

Pilot study two: Design Practice 1

11. Did the file take long to download?
12. Could you open the file?
13. Were there any issues in listening to the file (distortion/pauses etc)?
14. What media did you use to listen to the file (computer/mp3)?
15. Was my voice clear and easy to understand?
16. Did you like having audio feedback for your DP1 group work, why (not)?
17. You didn't have your folios with you when you were listening to the file, did that make a difference?

Design Context lecture

18. Did any of you notice there was an audio file of 1 of the lectures on Learn? Did you listen to it etc?

General

19. What other uses can you think of for audio technology (tutorials etc)
20. How do you feel about uploading your work and accessing your feedback via Learn?
21. What do you want from feedback?
22. What areas would you change about feedback?
23. What do you think about the use of audio feedback in the future?

The focus group was recorded and transcribed immediately afterwards. Analysis was carried out by hand. 'Coding and clustering' is a common procedure for analysing qualitative data and was chosen for the analysis within this project as it allows the researcher to derive meaning from words and build theory from data [8][9][10].

3. Issues - integrating audio feedback with Learn

The Learn/Moodle service at Loughborough University enables staff and students to post information to assist in learning and module administration. The possibility of integrating with this technology to assist in audio feedback on modules was also being explored during pilot studies one and two. The requirements for giving feedback via the online service were:

- to facilitate ease of upload and file return from staff member to student
- to ensure the audio feedback file is only accessible by the individual student.

The original plan was to deliver the audio files back to students via the University's virtual learning environment (Learn) during pilot studies one and two, however the technology has not yet been resolved. Currently the Learn/Moodle service at Loughborough University offers two feedback mechanisms. The first allows a podcast to be uploaded which is accessible to all module participants. This would contravene students' rights to confidential feedback and therefore was not suitable. The second allows a file to be uploaded as a reply to a file uploaded by a student. For this academic year students were not asked to submit their essays electronically, however this is an option being reviewed for the 2009/10 academic year. During the focus groups students were asked a hypothetical question about how they would feel if the whole assignment process was automated, with students uploading their work and receiving feedback via Learn. Students said that this would be useful to them as long as they had something as a record to state that they had submitted their work. They stated that it was a good idea as they would not have to come into the Department just to submit work as they would be able to do it remotely. It is hoped that future pilot studies, planned for the summer term, will investigate this facility further. It would not be possible for students to upload design folios electronically as these are done by hand, however discussions with the Learn team suggest that mechanisms for sending files to students, without having first received one from them, can be developed. Previous investigations into the automated return of audio feedback files have been successful and these will be used as inspiration [5].

4. Evidence of success

All students who took part in the audio trials were extremely positive about receiving audio feedback.

Pilot study one – essay feedback

All six students who took part in the focus group were able to download their audio feedback file onto their personal computers. The students all listened to the audio file via their computer, on either Windows Media Player or iTunes. None of the students downloaded the audio file onto a portable MP3 player or other listening device. They all stated that the file size meant that it downloaded and opened quickly. All of the audio files played without pause or distortion and students all agreed that the feedback voice was clear and audible throughout the feedback.

One student had their essay in front of them as they listened to the audio feedback. The other students did not. All students stated that they would have benefited from listening to the audio feedback with their essay in front of them.

When asked which form of feedback the students preferred (as they received both audio and written feedback for this submission) all six (100%) students stated they preferred the audio feedback. Given the choice all six students said they would like to receive all their feedback via audio files in the future. Students stated the audio feedback was easier to understand and that they got more in-depth feedback. All six students said they got more feedback on the audio file than was written down. One students describes:

It was easier to show what you did wrong. You actually had time to describe what you did wrong. On the written feedback its not always that clear.

This reflects findings from the other audio feedback projects, where students noted that 'audio made it easier to grasp what the lecturer felt was most important' [11] and that the 'ability to understand nuances, humour, tone and encouragement was a benefit' [3]. The students all stated that it was often very difficult to read the handwriting on written feedback, a problem that the audio feedback helps to overcome.

As part of the Design Context module students are required to submit two essays. All six students stated that they had listened to the audio feedback again while starting to write their second essay. They stated that having the feedback on file, on their computer, made this easy to do. Rotheram suggests this may also be due to the use of more natural language when giving audio feedback, making it more understandable and easier to 'feed-forward' for future assignments [11]. This suggests that audio technology may play an important role within the Kolb learning cycle (see Figure 1), allowing students to reflect on their experiences and use feedback from others to process their ideas, take ownership of them and integrate their new ideas into future assignments [12].

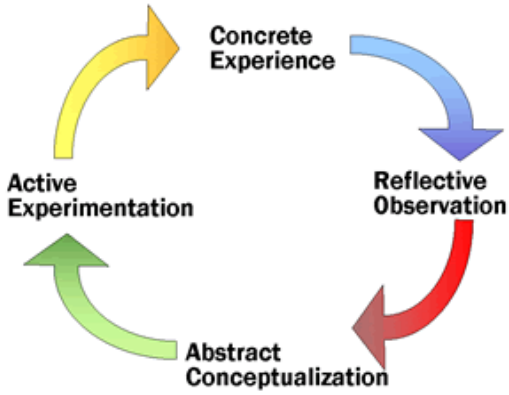

Figure 1. The Kolb learning cycle (Kolb, 1984 [12])

Pilot study two – group design folio feedback

Again all six students who took part in the focus group were able to download their audio feedback file onto their personal computers. The students all listened to the audio file via their computer, on either Windows media player or iTunes. None of the students downloaded the audio file onto a portable MP3 player or other listening device. They all stated that the file size meant that it downloaded and opened quickly. All of the audio files played without pause or distortion and students all agreed that the feedback voice was clear and audible throughout the feedback.

On this occasion students did not receive written feedback for their group work folios. All students (100%) stated that they liked receiving the feedback via audio file and stated the same reasons as for pilot study one. One criticism made by a number of students was that they did not have the design folio in front of them when listening to the audio feedback file. This was for two reasons. Firstly the folios were retained by staff members whilst other submissions for the same module were being marked. Secondly, had the folios been returned, only one students from each group of four would have had the work in front of them while listening to the audio file. This was due to each group only producing one folio of work. Students stated that when the audio file referred to specific pages, or elements of the work, it was not possible to know what those were. All students stated that they needed their design folios in front of them in order for feedback to be meaningful.

General feedback

During the pilot study period the researcher had recorded a number of lectures and seminar sessions and uploaded them onto the LEARN portal. Students were not told about this. Students were asked if they had noticed these audio files and made use of them at all. They hadn't. All students stated that this would be a very useful resource to have in future. One student, with dyslexia, stated that he was supposed to record lectures anyway, and that this would make it easier for him. Students stated that there was always more in the lecture than is represented in the PowerPoint slides (which are also deposited on LEARN) and that being able to use both in parallel would be very helpful. They

concluded that if this resource was available they would all still write notes during the lecture as they all find it valuable to note key points and summarise lecture content. The question of whether they would still attend lectures if both the visual slides and audio file was available to download was met with telling silence!

Students stated that for all their modules they would like audio feedback as it provides 'better feedback' and it 'shows your strengths and weaknesses more' and that 'it is nice to hear the feedback from your tutor directly as it is more personal'. Students stated that they felt the audio feedback was more personal and made them feel as thought the marker had taken more time over their work. These positive findings echo findings from previous research [11][3][5].

Finally students were asked how they would most like to get feedback. They stated that a one-to-one meeting to discuss their work would be most beneficial and personal to them, but they understood that with the numbers of students in the year (there are 160 first years and modules have between two and four staff) that this is not possible. They also stated that audio feedback appeared to be a good compromise between one-to-one tutorials and the impersonal nature of written feedback.

Feedback from staff

This report focuses on the initial stages of piloting audio technology. At this stage only one member of staff trialled the use of audio feedback to replace written feedback.

It was found that the time taken to give audio feedback compared to written feedback varied between the pilot studies. In pilot study one, where feedback was given on student essays, the member of staff took the same amount of time to give the audio feedback as to write written feedback. However, they felt they were giving more, and higher quality, feedback to each student in this time. The ability to go into more detail than in written feedback, use in-depth examples and articulate suggestions for improvement were felt to be extremely positive attributes of the audio feedback format. This ability to give higher quality feedback was also highlighted during the Sounds Good project, with staff stating that they 'took a little less time but gave much more detailed feedback and expanded on explanations'[11], and by Ennis-Reynolds, who states staff found it 'much more satisfactory' [5].

In pilot study two, where only audio feedback was given on design folios, the member of staff found it took considerably less time than in previous years when written feedback had been given. This was attributed to the ability to record feedback continuously whilst looking through the folio, and following the guidelines developed after pilot study one.

The use of audio technology for feedback is not without its drawbacks however. The need to find a quiet room and to re-record feedback after interruption, the laborious task of re-naming files after uploading them to the computer and the current need to email individual files to students, all meant that the overall time to give feedback to students was considerably increased. It is hoped that future studies will address this issue.

6. How can other academics reproduce this?

Firstly some basic principles were highlighted for pilot study one, but these could easily be used for general audio feedback, this included:

- the audio recording needs to include: name, date, name of module and name of tutor
- length of the file ideally needs to be 1-5 minutes
- feedback needs to be succinct
- lecturer needs to speak clearly into the dictaphone (See Figure 2).

Audio project – basic principles

The audio e-learning research project aims to explore the use of audio feedback from practitioners to students.

Audio marking guidelines

This brief guide will support practitioners in providing audio feedback to students.

Using the recorder

- turn on by moving the 'hold' button into the down position
- to record a message, simply press the 'record' button
- to pause the recorder press the 'record' button; press it again to continue
- to stop the recording press 'stop'
- you can hear the message by pressing 'play'
- the files will be renamed after the recordings so it is important that at the very start of each recording the group name, date, name of module and name of tutor are given.

For this pilot please record all feedback onto the recorder and pass back to Rhodes or Pete. We will then upload, rename and send the files to students.

Below are some useful guidelines:

- the audio recording needs to include: group name, date, name of module, tutor
- length of the file ideally needs to be **1-2 minutes**
- feedback needs to be **succinct**
- lecturer needs to speak **clearly** into the dictaphone.

Figure 2. Some basic principles for audio feedback.

After pilot study one it was considered essential for pilot study two to develop some more robust guidelines for staff members to follow. This would ensure quality and fairness of feedback and provide staff members with clear guiding principles for structuring their audio feedback recording. It was felt that the audio feedback files would be more clear if they included the marking guidelines at the start of the feedback, much as they are currently documented at the start of a written feedback form. For pilot study two, each audio feedback recorded began in the same way, as follows:

This is group _____'s feedback from Rhoda Trimingham for the group work element of the product Semantic – Form Investigation section of Design Practice 1. I am looking at your group folder for evidence of the following:

- *that you have collected a number of images that reflect the key word _____*
- *that you have ranked the collected images against the keyword*
- *and that you have analysed a number of images using the Form Analysis Criteria, that is looking at the silhouette, the graphics, the part lines and surfacing.*

7. Reflections

Staff are continuously looking at ways to make feedback more meaningful to students. Audio feedback clearly has tremendous potential for improving the quality of feedback. If audio feedback significantly improves the quality of feedback to students on a variety of assignments, whilst taking the same, or less, time for staff members, it should be integrated more widely throughout higher education. The results corroborate previous studies on the effectiveness of audio feedback. Overall, the findings of these projects have been very positive. Amongst the reasons for student preference towards audio feedback was that it was easier to understand because handwriting is often illegible and tone of voice helped understanding; that it had more depth and that it seemed more genuine. Staff giving audio feedback were also positive about audio feedback, stating that it allowed them to provide more detailed feedback within the same timescales as would be involved in written feedback.

One aspect that needs further research is the effect that scaling the project up will have on the success of audio feedback. The pilot studies were carried out using 11 students, but year groups

currently stand at 160 students. Many staff who give feedback on essay writing use stock remarks to reduce the time taken to mark each essay, as many essays require the same feedback. It must be considered that using audio feedback on large numbers of essays may lead to duplication of effort and dissatisfaction among staff. Design folios are much more personal to individuals and therefore feedback tends to be more student-specific. The inability to annotate design folios and the portable nature of MP3 players may lend themselves to marking large numbers of folios. The issue of scaling up will be investigated further in the 2009/10 academic year.

The only criticism of audio feedback is that currently the technology at the back end of the process is letting the system down and making audio technology time consuming for staff. Investigation is now required into the integration of audio feedback into virtual learning environments in order to make it a feasible tool for providing meaningful feedback to students.

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