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Abstract

Ongoing and successful development work around the design and delivery of audio feedback and audio lecture note-making at Sheffield Hallam University, together with an awareness of how digital audio might be used to empower disabled students, led to the proposal for the Student Audio Notes project. The idea of digital audio-enhanced learner autonomy had emerged from earlier work by the authors which had suggested that feedback could be more meaningful if the learner takes responsibility for gathering it and feeding it forward into their studies and indeed, later, into their employment. This learner responsibility provided an important focus for The Student Audio Notes Project (SANP): a year-long investigation into how students might use MP3 recording devices to enrich their own experiences of learning. SANP gave out MP3 recorders to participating students and aimed to encourage and challenge these students to explore how the devices could be used so that good practice might emerge and be shared. It was hoped that they would identify and record any encounters involving verbalised communication that they felt helpful in deepening and reflecting upon their learning. In this way the act of audio recording would ideally become an essential, ever-present, autonomous learning habit for them.

A strand of this investigation sought to find out, in particular, whether the recording of digital audio by disabled students could bring benefits to disabled learners. As the study by Healey *et al.* (2006) showed, 51% of disabled students (n=276) responded well to tutor support aimed at improving the standard of their academic work, as opposed to the 43% of non-disabled students (n=272). It was expected, therefore, that student's use of audio note-making would result in similar beneficial impacts. When note-making systems are used effectively, as previous research by Intons-Peterson and Fournier (1986) has also shown, note-making can increase memory encoding in the learner and so enhance their ability to recall the information later. Therefore, it was hoped that SANP would show how audio note-making could be effective in empowering students with disabilities.

Findings from SANP demonstrate that all participating students discovered benefits from using recording devices and that they found it useful to capture a range formal, semi-formal and informal situations. These findings raise questions for further research and support and some recommendations are made to ensure such activity is properly undertaken and supported.

Introduction

The recording of face-to-face student-tutor feedback conversations by the tutor and their subsequent distribution back to the student has been shown to be an effective and attractive method of encouraging greater formative engagement with learning (Nortcliffe and Middleton, 2007). Audio, in this approach, provides the opportunity to capture an otherwise ephemeral experience and increases the extent to which students are able to feed forward conversational outcomes into their learning without seeking further clarification and confirmation from the academic.

However, this model is difficult to operate amongst large cohorts and can significantly add to the academic workload due to the generation and distribution of the audio recordings, and can be constrained by the academic's view of what a feedback learning resource should be for their students

(Nortcliffe and Middleton, 2008). Further research into the strategic and selective audio recording of lectures and other learning events has been shown to be beneficial for disabled students (Nortcliffe and Middleton, 2006). If recordings are not made available quickly the formative affect of learning conversations decreases with the passing of time, with the conversation becoming a vague memory (Waterfield *et al.*, 2006). However, this is true for all students, whether they are disabled or not.

One of the aims of Higher Education is to help students to become autonomous learners (Race, 2001). However, learner autonomy is contentious in some quarters where there are concerns that it may engender inequality for disabled students (Goodley, 2007). For example, dyslexic students are dependent upon their tutors and third parties to review their material more than once (Madriaga, 2007). Under the Special Educational Needs and Disability Act 2001 every educational establishment is required to make reasonable adjustment in providing equivalent access to the curriculum. Some stakeholders may interpret reasonable adjustment as being an "academic crutch" for disabled students, even to the extent that it actually hinders the development of additional student skills that enable them to cope with their disability. As Riddick (2003) observed, students who didn't declare their learning disability were able to develop effective coping strategies. Higher Education needs to enable students to develop a range of transferable skills for self-support and so give them the ability to work with minimum supervision (Race, 2001).

However, when audio notes are produced by the academic, learner control is removed and the potential meaning and affect on learning is likely to be diffused too. Recordings made and distributed by academics in the form of audio lecture notes and formative conversations have been shown to increase learner autonomy (Fidler *et al.*, 2006). In this study, student memory was refreshed when the recordings were played back, re-engaging them cognitively. It would seem logical, therefore, to give students the responsibility of making their own audio 'notes', including the responsibility to gather audio feedback. Such a shift may offer a more learner-centred and autonomous approach to the selection, generation and management of audio learning resources, thereby instilling greater meaning and a sense of ownership over the learning process.

Methodology

Student volunteers were sought from across Sheffield Hallam University. Each student was supplied with a simple to use MP3 recording device with a built in microphone and 4GB memory, costing approximately £30. A total of 52 students signed up for the Student Audio Notes Project. Students were encouraged to take more responsibility for their learning by generating their own personalised learning recordings; to do this, they were invited to record interventions that they felt would be useful, whether those interventions were formal, semi-formal or informal encounters.

Student volunteers came forward from Sheffield Hallam University degree programmes as diverse as Psychology, Fine Art and Computing. A day was set aside so that they could drop in to collect their audio recorder and to receive guidance on how to use it. They also discussed how and where they might use it,

being encouraged to record any verbalised learning opportunity involving interactions with peers, tutors, and placement supervisors, as well as making personal notes.

During the brief induction meeting the students were also briefed on recording etiquette. Specifically, students were advised to ask permission of those who they wished to record and to explain to them why they thought making the recording would be useful. They were advised to reassure respondents and participants that the audio recordings would only be used to assist their learning and would not be shared beyond the University. However, students were encouraged to share their recordings with their peers in order to develop further learning opportunities through peer conversation; previous research had indicated that the sharing of audio recordings amongst peers was valuable (Middleton and Nortcliffe, 2009). The students were also advised to respect the wishes of staff and their fellow students if they were not happy to be recorded. Each student was required to sign a project protocol agreement that defined their role in the project and the appropriate use of the audio device during their studies.

The students were further supported throughout the project via email and the Virtual Learning Environment (VLE), where an online project organization site was set up that included podcasts and discussion boards. These were intended to enable all project staff and student members to support one another.

Evaluation

A mix of quantitative and qualitative research methods were employed to capture the students' varied experiences. Some students were interviewed about their expectations of the project at induction; online surveys were conducted after the first semester of the project and again at the end of the project. Also, many students took part in mid-project review focus group discussions and end of project focus groups. Results from all activities were fed back to all participants through the VLE site at the earliest opportunity so that knowledge could be shared to further impact the project.

Initial Student Perceptions

A sample interview of student volunteers indicated that their initial rationale was varied as to why they were personally attracted to take part in the Student Audio Notes project. However, initial perceptions of the project were that it would increase their learning:

> Student A, "Supervised final year project, recording the chats with my supervisors."

> Student B, "In group work I sometimes forget other people's ideas. It would be good to go back and remember them."

> Student C, "I have seen other students actually recording lectures and thought that looked like a really good idea ...to have it all and to be able to go back to whenever you want to and also for feedback from the lecturer. Sometimes it is hard to take it all in and remember it all."

Student D, "I have found I learn by listening more than anything else. Also light bulb moments, I always forget things I think of, so if I can record it I will remember it better"

Student E, "I have been asked to interview industrial professionals towards my research project, so obviously having a recording device for interview purposes is ideal."

Student F, "I have had a Dictaphone before. Never been sure how to use it or how to make the most it though I meant to learn new techniques for how to use it …better notes for my lectures."

Student G, "I used to record my lectures last year …students in my group benefited from it by borrowing them from me and re-listening to what I recorded. [The Student Audio Notes project] gives me the opportunity to feedback on how I use the device and at the same time discuss my own ideas [for using the device]. I thought it would open my mind more."

Student H, "I thought it would be very interesting to see how taking audio notes would help people learn."

Initial Survey

As reported by Nortcliffe *et al* (2009), 31 out of 50 students enrolled on the Blackboard project support site and completed the initial online questionnaire three months after the project's launch. The results (see Table 1) indicate that the majority of the students intended to use the device for one purpose, i.e. recording of lectures.

Table 1: Initial Survey Results

Student Response (31 out 50 using MP3 devices to capture learning conversations)	Students Usage of MP3 creative devices
68%	Lecture
52%	Personal audio notes
42%	Peer conversations
35%	Tutor feedback

6%	**Work placement**
3%	**Interviewing**

As commented by Nortcliffe *et al.* (2009), half the students reported using the recorder to make personal audio notes, despite this approach not featuring in the student's own initial perceptions of the project. Typically personal audio notes involve the use of the device as an external memory aid use to capture personal actions and thoughts, ideas for assessment, and observations to support their reflections on learning.

The survey results further indicate that over half the students followed up listening back to the recordings typically within a few days of making the audio interventions. Respondents believed that listening back enabled them to cognitively reconnect with the material. Concurring with the findings of Rossiter *et al.* (2009), the majority of the students agreed or strongly agreed that they found the recordings useful and had helped to improve their learning:

> "Mainly recording lectures and assignment workshops. I have found this device EXTREMELY useful as it is much better than recording notes by hand only, and eradicates the problems I have with bad handwriting."

Importantly, over half the students agreed that the Student Audio Notes project had helped them to become more autonomous as learners. This is demonstrated by the following student's free comments in the survey,

> "...listen to them routinely...dig them out whenever I need to refresh my memory, or need to recall something for the assignments."

Mid-project focus group

The first focus groups took the form of semi-structured conversations, an approach that is outlined in Cohen *et al.*, 2000. This involved interviews with nine students from the project, who talked about their experience in pairs or individually. The interviews indicated that the students were deploying the devices in a variety of ways and had a variety of methods for managing and using the audio recordings. In particular, the focus groups revealed that the initial student ideas for how the devices could be used had changed and multiplied. There were more creative and constructive uses beyond the initial idea of simply recording lectures; however, this approach is still the most common application. A number of students indicated they were now recording feedback and personal notes:

> "I have used it lot more last semester than this semester, because it was useful for my essays when we had lectures on essays …it was useful then ...but this semester I used it twice …I sort of forgot about it for first two to three weeks …I used it with a lecturer after the lecture, on one to one."

"Use it in numerous different ways, in first semester… I recorded lectures… bits I needed to record that I thought I would not understand… then I used it to listen to oppose to my music… to try revise a subject."

"I am using my phone… my phone recorder and it is much better … I make recordings once to twice a week… [record] lectures …group meetings, maybe supervisor for project."

"It meets the needs… why I got it in the first place… I record things as opposed to them falling straight back out of my head or if I am in class I can record it."

"Mainly in lectures, I haven't used it for other things… I do realise it has potential to be used for other stuff."

"It has got less and less. I find recording lectures is pointless… I can't really hear what the lecturer is saying …group meetings and discussions, random thoughts I record quite a lot."

Second survey

16 out of 50 students enrolled on the Student Audio Notes Project Blackboard site completed the second survey at the end of the academic year. The highlights of the survey (see Table 2) illustrate that the majority believed that using the audio device in their studies has been beneficial to their learning and that they would recommend its use to other students as a way to enhance their learning. However, the students' response to whether it has helped them become more independent in their learning is mixed, and the rationale of those who felt that it has helped them to become more autonomous as learners was that:

"I can refer back to the recording for information rather than asking others."

"If there was something I'd missed out when writing lecture notes, I'd normally have to go to friends to get that information from them (and visa versa), though with the audio device I've been able to seek out that information for myself through listening to the audio from those lectures."

"It opened my eyes a little to taking control of my learning rather than just turning up to a lecture because I'm supposed to."

"I wouldn't say it has made me more independent as I already try to do that, but I do think it helped distinguish important points, such as artists' names, dates etc that I could add to my journals."

Table 2: Highlights of the Second Survey

Survey Questions	Student Response (16 out 50 using MP3 devices to capture learning conversations)
Has the audio been helpful to you and your studies and your learning?	56% Agree or Strongly Agree
Have the audio recordings helped you to improve your learning?	56% Agree or Strongly Agree
Have the audio recordings helped you to become a more independent in your learning?	37.5% Neither Agree or Disagree
Has audio recording helped you to gain a deeper understanding of your studies?	44% Agree or Strongly Agree
Have you remembered to use the device regularly?	44% Agree or Strongly Agree
Has it become a habit to regularly use the audio device?	37.5% Agree or Strongly Agree
Has audio recording helped you to reflect on your studies/understanding/learning/ abilities/ further development?	37.5% Agree or Strongly Agree
As a result of being involved in this project, would you recommend to other students to use an audio device in their studies?	75% Agree or Strongly Agree

The response to questions concerning the device's impact on deepening their learning is mixed. However, the majority agree or strongly agree that the use of the device has helped in this way. This is explained as follows:

"The notes I took highlighted things I had never realised before."

"As well as helping me to clear up some areas I was previously unsure about, it's also helped to reinforce those parts after listening to them multiple times."

"I analyse my studies from a more professional view point. Whether this was brought on by the audio recordings or just my progression of learning and maturity I cannot be sure."

"It has enabled me to retain information in a different format than the traditional pen and paper which was useful, and is easily accessible so one could listen to recordings whilst going for a run in the morning and give my brain and subconscious mind to work on things whilst doing something else - hence saving time!"

The final survey indicates that use of MP3 devices has had a wide impact on their learning (Table 3), feedback being the commonest approach identified. Feedback is critical to student learning and in supporting their ongoing progress (Gibbs and Simpson, 2004), and therefore any method that encourages student engagement with the feedback cycle is positive.

Table 3: Impact on students studies

Student Response (16 out 50 on how using MP3 devices has changed their approach to their studies and learning)	Changes to students' studies and learning as result of using of MP3 creative devices.
37.50%	studies
25.00%	assessment
25.00%	learning
25.00%	understanding
25.00%	interviewing
31.25%	attention in class (lecture/tutorial/workshop/laboratory/etc)
18.75%	project supervision
31.25%	working with others

25.00%	ideas
25.00%	skills
50.00%	feedback
37.50%	presentation
12.50%	learning with others
6.25%	abilities
6.25%	confidence
18.75%	performance
12.50%	communication
6.25%	placement
6.25%	placement/employment preparation

Final Focus Group

A focus group approach was again used, and involved three students from the project. The discussion between students revealed that they had discovered even more practical applications for the device in order to support their learning and its potential for further personal development in the working practice:

> "I've used it for seminars, group work and lectures as well. And I used it on my placement as a kind of diary record... It's useful with your supervisor because your supervisor will tell you stuff and you're not having to write stuff down all the time. You've actually got a record of it without having to [interrupt the conversation]."

It was also observed that audio recordings can have different affects on the learner as they re-access them over time:

> "I use it for little groups when we're doing group work seminars, meetings with my supervisor. I find it really useful for revising. I record my [written] notes and then listen back to it again and again and again."

> "I've gone back and listened to things and it's made more sense because I understand things better. Maybe as I've got a bit more experience."

This suggests that audio devices have not only supported their immediate learning needs, but have the potential to continue to make an impact in supporting the individual's professional development where audio notes can be used as a tool for reflective practice and for logging Continuous Practice Development (CPD) activities:

> "It was useful for reflective practice because you can record stuff and then go back ...later in the day and see what happened. And that's what you need to do for your CPD."

Practical applications in learning could be useful as professionals too, for example:

> "I've used it to write my dissertation when I've had ideas and put it beside my bed and when I've woken up and I've had an idea 'and I must do that... write this bit like this or '... so I've used it like this as well."

Conclusions and project reflection

A central question for this project was concerned with the extent to which our students were ready to exploit the devices they own in making audio notes, in their many forms, so that they can effectively learn from them. The evidence generated during the project indicates that students increasingly own devices that are capable of making recordings of lectures, conversations and personal reflections, and that the ubiquity of this technology is likely to develop, especially through mobile phone ownership. Such audio devices can provide continued access to valuable formal, semi-formal and informal learning opportunities, and the challenge now is to disseminate the positive experiences of the student partners in this project to all students who could benefit from engaging with these technologies. It is also important to ensure that academic staff, systems administrators, and managers appreciate the value of this technology-enhanced method of autonomous learning so that systems, policies and protocols do not conflict with the practice of audio recording.

It was remarkable, and this should be stressed, that all students discovered greater benefits for themselves from using the audio devices. It can also be suggested that recording lectures might be only the tip of the iceberg to how they might exploit audio.

The success of this project would suggest that listening to an event a second time enables the students to reflect upon what was said and to rectify any misconceptions or mishearing; as well as being able to reconsider and reconnect with the information. For some students the act of recording helped them to become reflective learners as it helped them appreciate the significance of interventions from peers and tutors.

The audio recorders were discrete and highly mobile, arguably becoming a 21st century 'pen' for some learners who began to make notes in situations that hitherto had been ephemeral. This is demonstrated in the use of the device by the students on work placement who explored how it could enhance their professional abilities and CPD.

Students recommend regularly using the audio device and carrying it at all times, saying they would replace it if they lost is,

> "Yes, it's been valuable and I would replace it. I can use it for practice once I get a job."

> "Yes, I'll definitely keep recording stuff... I definitely would do it. If I had to start my undergrad again I definitely would start recording from the beginning. I wish I'd used it earlier."

> "I wish I'd used mine earlier as well."

Some recommendations

The use of audio recorders by students has until now been a grey area. There appears to be a lack of literature on the subject, including on the practice of students taking recorders into lectures. In order for the benefits that have been revealed through this study to have wider impact we recommend that,

- students are encouraged to make notes using their own MP3 recorders or mobile phone voice memo technology (as long as they are switched to flight mode to avoid interference);
- students record feedback conversations with tutors and peers so they can be more attentive at the time and reflective later;
- students are supported in listening back to the notes they make, reflecting on and developing the information they have captured, perhaps in written form;
- students are guided in seeking permission from those who they wish to record;
- students consider sharing their notes with others on their modules and using the recordings as a focal point for further conversation;
- students copy their recordings from their mobile devices to avoid loss and back up their audio note files, especially in the absence of written notes;
- students rename their files systematically and meaningfully;
- students are discouraged from sharing their recordings of other people beyond those involved with their module;
- students are discouraged from editing their recordings unless doing so helps them to actively engage with what was said. Editing can add a significant layer of work to the practice;
- academics are open to lectures, seminars, tutorials and the conversations they have with their students being recorded;
- academics challenge their students to regularly review their recordings and share them with their fellow learners;
- institutions are supportive of audio note making practice;

- institutions are proactive in extending network storage capacity so that students can safely manage their digital media artefacts.

The practice of audio note making requires a proactive response in order that those involved are clear about what is useful and acceptable. It also provides a new opportunity to discuss digital literacy for the twentyfirst century learner with those learners and their peers.

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