Audio feedback design: principles and emerging practice

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Abstract

This paper considers the design of audio feedback as experienced in several faculties of a UK university and as identified in the literature. Several adaptable models are presented, including: 'Personal tutor monologue' recorded at the PC by the tutor as part of the marking process; 'Personal feedback conversations,' recorded by the tutor or student(s) in the lab or studio to capture project discussions or studio 'crits'; 'Broadcast feedback' targeted at large groups; 'Peer audio feedback,' in which students learn as they assess each other's work; 'Tutor conversations', a 'common room conversation' approach designed to model critical thinking; and 'Personal audio interventions,' targeted at individuals to address emerging issues. The methods are introduced and evaluated according to their potential to formatively affect learning. Audio feedback design factors are outlined and practical recommendations are offered. The paper concludes that the use of audio feedback can promote a culture of dialogic engagement.

Introduction

The term 'audio feedback' encapsulates a set of technology-enhanced pedagogies that is proving attractive to academics in addressing teaching challenges in higher education today. Gibbs and Simpson (2004) outlined those challenges and Nicol (2008) presents a similar list in discussing how assessment can be reconfigured in helping to overcome some of the pressure points, which include: increased class sizes and teaching loads; modularisation and constraints on resources; a gradual shift towards learner-centred pedagogy; and the introduction of technology. Such challenges require teachers to be creative in reappraising the curriculum, the way it is delivered, and the specific contexts in which they work.

Some technology-supported innovations remain as niche applications, explored and applied by select and often familiar groups of confident academic learning technology advocates. Audio feedback, on the other hand, appears to be a rare example of an educational technology that holds an exigent interest for academics, irrespective of their prior involvement with digital media or learning technology. Academics need to engage closely with their students despite the prevalent challenges already noted and Ramsden (1992) has suggested that assessment can be the most powerful tool in doing this.

This paper explores the interest amongst academic staff in using digital audio as a formative tool. Drawing upon case studies at Sheffield Hallam University, and with reference to other examples in the literature, this paper proposes 10 guiding principles towards effective audio feedback design. The academic considering the use of audio feedback is positioned here as 'designer'.

Background

Audio feedback can be defined as the part of the formative communication process between tutors and students, or students and their peers, that is recorded and distributed as digital audio. Recordings can be distributed to individual students, student groups or to whole cohorts in response to both ongoing and submitted work with the intention of supporting each student in developing their knowledge and the way they learn (Middleton 2008).

As this paper will demonstrate, well-designed audio feedback approaches are crafted balances of technology and pedagogic purpose in which the supportive voice is used to inform, challenge, and encourage each student to reflect and progress. Audio feedback is often associated with assessment, though it can be helpful to consider academic feedback design independently of this context, for example, as a component in a deep learning strategy driving the "active engagement of students in evaluating and applying ideas and in interpreting meaning" France and Ribchester 2008, p.71).

On feedback

Gibbs and Simpson (2004, p.9), in reviewing the literature on feedback, propose that feedback is "the most powerful single influence on student achievement. However, even when academics do succeed in producing feedback, it is not always effective; apart from being too late, not readily accessible, and not meaningful, it is often dismissed or ignored by students (Wotjas 1998; Hounsell 1987) and it can even be damaging if it undermines a student's motivation and confidence." So, on the one hand, feedback can help us meet the challenges, but at the same time we must take a considered approach to using it.

Feedback is used, in general, as a catch-all term for a number of academic functions as Gibbs and Simpson note (2004, pp 19-20). They say, for example, it can be applied to "correct errors; develop understanding through explanations; generate more learning by suggesting further specific study tasks; promote the development of generic skills by focusing on evidence of the use of skills rather than on the content; promote meta-cognition by encouraging students' reflection and awareness of learning processes involved in the assignment; encourage students to continue studying." When, where, and how these functions are executed are questions that indicate there is a need for applications to be carefully designed.

Nicol and MacFarlane-Dick's seven principles for formative assessment and self-regulated learning (2006) offer a useful framework for the design of feedback, defining good feedback practice as, "anything that might strengthen the students' capacity to self-regulate their own performance." Positing their seven principles upon an analysis of the literature, they suggest good feedback practice clarifies what good performance looks like; helps the development of self-assessment amongst learners; offers high quality information to students about their learning; promotes teacher-peer dialogue; is encouraging and promotes self-esteem; is constructive in supporting students in reaching their goals; and finally, provides feedback to teachers to inform future teaching.

'Meaningful' is a word frequently used in the literature on student feedback (e.g. Brown 2001), though meaning changes over time and with each 'reading' of an academic text or other academic engagement. Part of any academic context is, of course, the receptivity and preparedness of each student to cognitively connect to the feedback in a way that is meaningful to them at that particular point in time.

Glover and Brown (2006) ask, "If a comment is made, what do you expect the student to do about it?" pointing out that, "feedback is effective if students act upon it to improve their future work." They note that, even where there is a quantity and frequency of feedback, it is the quality of the feedback that is most important. This echoes the work of Gibbs, Simpson and MacDonald (2003) who highlighted the need for students to receive, consider and act upon feedback. Feedback designers should know what impact the feedback is intended to make, and ensure this is communicated to the student in the feedback, together with guidance on how they should apply it.

Sadler (1989) proposed that effective formative feedback should enable students to monitor the quality of their own work in relation to the received feedback, whilst understanding how to apply it. This suggests that part of the value of generic feedback is that it provides a yard-stick against which students can measure their work.

Chickering and Gamson's (1987) 4th principle of good practice in undergraduate education proposes that giving good feedback to students is essential because, "knowing what you know and don't know focuses your learning." Building upon these seven principles, Chickering and Ehrmann (1996) note that there are many ways in which new technologies can provide feedback.

Despite a greater understanding of formative assessment, MacLellan (2001, p.307) found that, "while staff declared a commitment to the formative purposes of assessment," this was often not evident in their practice, whilst students were underdeveloped in their conception of assessment. This suggests that there is still a need to find formative methods that engage both tutors and students.

On audio feedback

> *We're finding that the feedback is fresh. It's feedback that is alive rather than something that is dead on paper [and] the feedback, I think, is more accurate, albeit sometimes a little bit woolly around the edges.*
>
> [Physical Education tutor from this study]

Audio feedback is not new. Tutors have used cassette tapes, especially in support of Distance Learning, for many years (Kelly and Ryan 1983). Durbridge (1984) identified that audio can enhance meaning and has the capacity to convey the tutor's enthusiasm. Cryer and Nakumba (1987) found tape recording feedback saved the tutor time and supported the capturing and sharing of ideas whilst conveying subtle meaning in a spontaneous way and with more immediacy. They describe how the voice can "soften criticism" and be encouraging, appreciating the value found in the tone of voice. Because audio tape made it difficult to edit errors, the linearity of the process constrained them, but this constraint added to the veracity of the tutor's engagement. Consequently student recipients noted that it was essential to listen to all of the tape before updating their work, realising that the tutor's advice was liable to change. Recipients also highlighted the need to find somewhere useful to listen and that it takes longer to listen than read.

Takemoto (1987, p.19) recognised the opportunities of the emerging technologies of the world 20 years ago:

> *As technological developments rapidly expand in all forms of electronic media, and specifically in audio, today's [1987] classroom can literally be almost anywhere—at the industrial worksite interconnected via audio teleconference equipment; in an automobile equipped with a radio or audiocassette deck; at home with listeners by a radio, audiocassette player, compact disc player, or telephone; even in the shower with a waterproof radio! Quite feasibly, with the help of the audio medium, there is no place that is "outside the classroom" anymore.*

These early commentators hint at the inflexibility inherent in an analogue medium that restricts the user's navigation of the recording. Tapes were also unrelaible and difficult to manage, however these limitations have been largely overcome with the advent of *digital* media.

The asynchronous use of voice (i.e. a voice that can be accessed at a time that suits the user) is where some of the key benefits of audio feedback can be found, yet perhaps the opportunity for the student to repeatedly learn from *re*visiting recordings is an aspect of audio feedback that is not discussed enough in the literature (Nortcliffe and Middleton 2008).

Digital audio is a relatively unfamiliar media for most academics, though fits well with a developing recognition of how new virtual and physical spaces can support learning in the digital age, both formally and informally (Kesterton and Aspden 2007). It could be argued that digital audio, distributed through headphones directly to the ears of each student for their personal attention, allows the academic to engage with their students more closely than has

been possible before. This proximity offers the academic audio designer many challenges, as well as opportunities, but recognition by designers that a new semi-formal and pastoral positioning is possible, and indeed may be useful, is worth consideration.

The receipt of feedback, delivered through any medium, as noted by Higgins (2000, p.7) is, "an emotional business," and care should be taken in its design as inadequately communicated or interpreted comments can be damaging. Nicol and MacFarlane-Dick (2006, p.64) indicate that, "there is strong evidence that feedback messages are invariably complex and difficult to decipher, and that students require opportunities to construct actively an understanding of them (e.g. through discussion)." Higgins, Hartley and Skelton (2001, p.273) also highlight the complexity of getting the message across, recognising that feedback is a, "problematic form of communication involving particular social relationships," and that its design can't be taken for granted. The introduction of technology can add to the complexity, as we shall see, but audio's suitability to not only carry the message through the words it delivers, but to convey layers of meaning through the nuances of the human voice (Rust 2001) suggests its value may lie in helping the learner to decipher this complexity. At the same time however, France and Ribchester (2008) caution us that these academic commentaries should be concerned with student performance and learning and they should not, as Gibbs and Simpson (2004) point out, stray into giving opinion about the personal characteristics of the student.

Audio technology offers the academic a powerful way to intervene in actively directing the student. The concept of media intervention (Middleton 2008; Middleton and Mather 2008) outlines how media can do much more than transmit the tutor's knowledge; it can support motivational, challenging, orienting and seeding voices that point the learner in new and meaningful directions. Nicol and MacFarlane-Dick (2006, p.64) discus the notion of self-regulated learners and how formative assessment should be used to empower students. Audio feedback designers should consider, therefore, whether the feedback they give supports their learners in setting their own learning goals and monitoring their learning, thus "regulat[ing], and control[ing] their cognition, motivation, and behaviour" (*ibid*).

Citing Boud (2000), they say, "if formative assessment is exclusively in the hands of teachers, then it is difficult to see how students can become empowered and develop the self-regulation skills needed to prepare them for learning outside university and throughout life." So audio, if we consider it as an intervention, can be designed not to just transmit detail, but to engage the learner in helping them to identify and address challenges for themselves. Some students may want to know which 'i's need to be dotted and which 't's need to be crossed, but for academics seeking to engage and facilitate student self-regulated discovery, audio communication channels can be used to guide and encourage the student without having to literally spell it out for them.

Audio feedback, in a Constructivist learning paradigm, should be designed to promote timely reconsideration, reconstruction and redirection of personal knowledge creation by students. In group work it can be used to promote a more social evaluation, reconstruction and modification of knowledge. Indeed, the use of audio feedback, even in a VLE, may lead to greater discourse amongst the learning community if used well.

Rotheram (2007) highlights the tension between student ratios and the desire to offer a meaningful student experience as a key driver in his work on audio feedback. As with most commentators cited here, he demonstrates that students value audio feedback. For example, they appreciate the personal engagement, the demonstration of the tutor's interest, and the opportunity to reflect on the advice away from the face-to-face tutor encounter. He values not only the impact on the students, but the benefits that using an MP3 recorder can have on the tutor's workload.

Ice *et al.* (2007, p.3) believe that the auditory element in the mix can strengthen the sense of community and make it more personalised. They found, "extremely high student satisfaction with the embedded asynchronous audio feedback," and believe this contributed significantly

to student's engagement with content in general. However, a small percentage did not prefer audio feedback over written feedback.

Sipple (2007, p.31) found that audio feedback increased student's self-confidence, helped them to internalise the feedback, reduced misinterpretation, and strengthened their bond with the tutor. One important aspect for her stems from student attitudinal change: "When attitudes change, student's behavior and commitment to improvement may change."

Though students like audio feedback, it is difficult to measure its impact. Though novelty may explain the appreciative responses of some students, others clearly believe it has helped them do well (Middleton and Nortcliffe 2008). In addition to the qualities found in the human voice and the timely application of feedback, the innovative affordances of digital audio are that it can be quick to produce and distribute and this can help to address the challenge of feedback that is too late to be useful (Gibbs and Simpson 2004).

Furthermore, some commentators have noted the following ways in which audio is particularly useful: it is cheap, simple to produce and use, portable, and ubiquitous (Takemoto 1987); it signals tutor interest and engagement (Rotheram 2007); important points can be emphasised through their selection and through the tutor's intonation (Middleton 2008); it can be rediscovered and replayed, and has capacity to stimulate and support *re*-engagement with personal development (Nortcliffe and Middleton 2008); and creates a personalised mark in the sand that can help students to reflect on their progress.

Context

Design is usually driven by a requirements analysis; understanding of the learning and teaching context should determine the application of any learning technology therefore. However, local factors make the replication of learning technology models difficult (Kirkwood 2003). Siemens (2007) describes context, in relation to learning, as being determined by environmental factors, circumstantial factors, or events. Understanding context can be complex, but requires that each implementation of learning technology is carefully considered and that implementation models are adapted to suit local needs.

Like 'podcasting', 'audio feedback' is a clumsy term, useful for engaging initial interest, but too simple to communicate its diverse potential. In the literature discussed here the description of the local contexts is significant in determining the final designs. Some of the approaches are quite different, whilst others appear to be similar. Ribchester and France (2008), for example, describe an innovative approach involving the appending of personal feedback to generic feedback stubs. Rotheram (2007) and Sipple (2007) describe personal feedback approaches based upon the tutor's commentary on a submitted paper.

Ng'ambi (cited in Nie *et al.* 2008) used audio to mediate reflective practice. Student groups recorded their presentations and the questions and answers that followed. This allowed the students to reflect on what was said later. Their capture of peer and self-assessment found a new life, therefore, as a recording feeding into a further reflective activity.

Methodology

The primary aim of this study was to identify factors affecting the implementation of audio feedback, leading towards the development of a set of design principles. Secondly, the study aimed to understand the range of approaches that can be taken in using audio to offer a formative experience. A qualitative case study methodology was used that sought to understand the phenomena of audio feedback through a "small number of naturally occurring settings" (Bloor and Wood 2006, p.27) and, in particular, to "capture the complexity and situatedness of behaviour" (Cohen *et al.* 2001, p.79) amongst those using such approaches. A literature review was conducted to provide background to the study and to identify recurring themes and principles.

Design is a process in which variable factors are managed to effectively address specific requirements; however, the cases considered here were not consciously informed by any specific design-led approach to the use of audio feedback. A retrospective analysis of these approaches was conducted drawing upon the reflections of practitioners at Sheffield Hallam University in order to highlight their diversity.

The cases were selected through the ongoing work of the authors, both teachers and educational developers in higher education and their interest in exploring the educational potential of digital audio. The cases investigated in this study were selected from the TALI project, a university-wide assessment for learning initiative. They were selected to demonstrate the diversity of understandings of, and approaches to, giving feedback and its pedagogic purpose.

Semi-structured interviews with academics about their use of audio feedback were recorded with participant consent over a two year period. The recordings were initially conducted as a way of sharing of innovative practice amongst peers.

Participants were asked,

- Why did you decide to use audio feedback?
- What other forms of feedback are you using and how does this work with the audio feedback? Does the audio feedback replace other feedback?
- How much feedback did you give and what structure did you use? How long is the feedback you are giving?
- What are the technical implications for you?
- How and where did you produce the audio feedback?
- How has this approach impacted on your workload?
- How scalable is the approach you are using?
- How and when did you distribute the audio to the students? What are the technical implications for your students?
- How have your students responded to the feedback?
- Will you continue to use audio feedback, what will you change in your methodology and why?

The stories of eight academics, captured in six recorded interviews and conversations were subsequently transcribed and analysed. As is discussed later, every instance of audio feedback production is different due to its local contextual requirements, however, seven different adaptable models emerged and these are described in the following section. Several academics were using more than one audio feedback technique, e.g. *Personal tutor monologue* and *Broadcast feedback*.

The interview transcripts and the literature on audio feedback were analysed to identify factors affecting the design and use of audio feedback and an attempt has been made to categorise these in table 1, 'Factors affecting the design of audio feedback.' The table indicates the extent to which factors can be controlled by the academic designer.

Ten principles for audio feedback design are suggested with the intention of guiding those considering similar approaches. These are derived from existing understandings of what constitutes effective feedback and from the experience of those who have used *audio* feedback.

Models from Sheffield Hallam University

Seven models are described here. All of the models are adaptable and are presented to demonstrate how audio can be used. They represent a synthesis of the approaches being used by the academics interviewed in this study. Alongside each of the descriptions there are quotes from some of the academics who have used each approach.

Personal tutor monologue

This is the most common approach taken by academics responding to submitted written work. It usually involves the tutor assessing the work at the PC using audio software to communicate directly with individuals or groups. Alternatively, a portable MP3 recorder is used by some because of the flexibility it offers. Some commentators suggest the benefits of this approach include the amount of detailed feedback that can be provided, especially where work has been submitted electronically, though others caution against saying too much. The approach overcomes the problem of illegible handwriting in the margin or endnote summaries on essays that are often left unread and is often used in combination with other techniques, such as assessment grids.

One academic commented, "audio is quicker, cleaner, a lot easier to use [than video] with my antiquated computer at home." Another confirmed that the students actually get the feedback more quickly than when using other methods, "because the technology's quite straightforward. It's scary, but once you get into it it's quite straightforward."

The use of voice was a driver for one academic,

> *[Teaching at a distance] can be faceless and very cold and giving feedback, especially poor feedback... very cold and harsh. Whereas, as you say, when you're giving audio feedback and you're giving bad news and you are explaining it, it seems much more human. They can tell that you've got a caring nature and you're trying to support them and it's not as critical as perhaps it is as when it's written in black and white.*

Though this is the simplest process described here, it still requires careful consideration in designing a workflow. Assessment criteria and learning outcomes provide useful structures,

> *I tend to structure the feedback by going through each of the learning outcomes... When I first started doing it I wrote it all down like a script and that took forever and then I thought that just doesn't sound natural.*

Another tutor explained, "What I'd actually done as I looked over the work was made a few rough notes - just bullet points really against each of the assessment criteria." Using those notes as his guide he worked quite quickly through a personal review of the student's work.

Most tutors said they don't edit their recordings. "I leave it in that very raw format because I just don't have the time to make it nice and snazzy." Another tutor explained that, if a mistake is made, it is easier to "collect your thoughts and just start again."

Personal feedback conversations

Tutor conversations with students in the lab, studio or workshop can be recorded by the tutor or student. This approach was adopted in a Software Engineering lab walkthrough process. The audio feedback was valued by the students as it recorded not only the voice of the academic, but their own contribution to the conversation. It enabled them to reflect on the conversations, helping them to reconnect with their own thoughts and ideas later. The intention was to inform the ongoing assignment.

The tutor recognised that the intensity of lab-based conversations, as they happen, can lead to key points being lost. She said, "[Even] I walk out the door and forget what I've said to the students!" She holds great store in the lab feedback being "more real" than comments on a sheet. A technology failure led to the tutor redoing the audio feedback in her office on one occasion: she noticed that the recordings became much shorter. She explained that lab-based

feedback "captures the realness of it. Whereas when I record in isolation... it doesn't seem real." Audio can turn an apparently informal lab conversation into a formal tutor intervention. She believes conversation is important: "It's a two way learning process" with the academic able to judge the student's understanding and the student able to judge the tutor's perception of their work.

Broadcast feedback

Broadcast feedback, or 'generic feedback', is targeted at assignment groups.

Gibbs and Simpson (2004, p.17) say that, "feedback has to be quite specific to be useful." Therefore broadcast feedback needs to clearly address specific points, but points that are valuable to all, and the style of the presentation needs to engage each listener. Broadcast feedback can be recorded during a feedback lecture or in a more private and reflective situation.

One tutor explained,

> *In the past when they'd submitted their proposals... I haven't really been able to turn round the feedback in time to get it back to the students. Whereas with the audio feedback I was able to... turn around the feedback within about 3 to 4 days.*

The feedback can be designed for reuse with subsequent iterations of the assignment as 'pre-feedback', allowing the tutor to draw upon the earlier cohort's experience.

Peer audio feedback

Using this approach, students constructively assess each other's work, learning through the process with the resultant audio file being shared with group members.

In one approach audio feedback worked well with student group assignments where they were encouraged to record their group meetings.

Sports students were introduced to the principles of peer assessment and asked to adopt the role of assessor in providing constructive comments for their peers. The tutor noted that,

> *Technically there were very, very few problems... the students had about 10 minutes instruction on how to use Audacity [audio software] with a USB headset... they did this all in a session... [They] could have walked around and spoken to one another, but I have to say, the students were very keen on listening to what it was that had been recorded.*

With students working through a second iteration of the assessment criteria, this time as assessors, he noted that, "It's a case of the people giving the feedback probably getting as much, if not more, out of the process as the people actually receiving it."

Tutor conversations

This is a fly-on-the-wall 'common room conversation' approach, with tutors addressing points that have emerged across seminar groups.

> *The idea was we'd sit down together after we'd done the observations and [discuss] what we'd seen, what we particularly liked in the observations, what sort of things we'd been looking for and hadn't seen... [We] tend to do quite a lot of talking about it to just see if we're thinking a long the same lines... We have these discussions anyway.*

The students can hear the tutors talking about the assignment and this provides insight into the way they think. It complements, and is different to, the written feedback they receive on this task,

> *"In writing we tend to think if you've said it once you've said it. And if you labour something... people find it quite difficult to read... If you say it [again] in speech, it's fine... We're actually quite careful to judge how we leave a student. And a lot of that is to do with tones of voice."*

Personal audio interventions

These are timely audio interventions, targeted at individuals, made by tutors to address important issues as they emerge, e.g. students at risk of failing or withdrawing from their studies. The main purpose is to quickly re-engage students with their studies, motivate them, and suggest ways forward, especially in situations where face-to-face attendance is a factor.

Peer exchange audio feedback

The Peer Exchange model is a development of the conversational approach involving tutor and students in the lab. It was developed for teams of Journalism students tasked with producing stories for their module podcast. The module ethos has a Communal Constructivist philosophy (Holmes *et al.* 2001) in which students make regular contributions for the common good with teams benefiting from a cross-pollination of ideas and experience. Student teams are required to give a progress report. One team member presents the report to the tutor and a representative from another team, who is expected to offer a constructive response, perhaps based on their own team's experience. Finally, the tutor offers their feedback. The whole conversation is recorded and shared back to the group immediately through the module content system, whilst the visiting observer takes ideas back to their own team.

The tutor commented,

> *I'm impressed with the way the student observers have accepted the responsibility of giving the first response. I think part of the reason it is working so well is because it's understood as an exchange of ideas and support. There's also quite a lot of emphasis in this module on 'developing a professional voice' and so the students are taking any opportunity they can to speak to mic!*

Factors affecting the design of audio feedback

The factors listed here are derived from an analysis of recordings made with practitioners and from evidence found in the literature on assessment, feedback and audio. Not all factors can be controlled by the designer but, nevertheless, they can affect the feedback and its workflow. A suggestion is offered for how much control the academic has over each factor. Factors are categorised to aid readability, though it would be possible to categorise them in other ways.

Table 1 - Factors affecting the design of audio feedback

Estimated indication of the academic's control over factors affecting feedback design: Yes=1, Probably=2, Maybe=3, Unlikely=4, No=5

Factors to consider	**Notes**
VOICES	
Number	how many voices are heard? (1)
Role	tutor, student, other (1)
Style	tone and intent e.g. supportive, instructive, critical, motivational, conversational, objective, etc (1)

PEDAGOGIC PURPOSE	
Purpose and requirements	the driver for the feedback (3)
Relationship	role of feedback to other academic interaction (2)
Combination of feedback mechanisms	marginalia, assessment grid, other general or targeted audio feedback, f2f, written summaries, etc (1)
Scope	e.g. selective to emphasise key points or extensive to cover the breadth of the subject (1)
Detail	detailed or indicative (1)
Timeliness	receipt of feedback affecting its impact (3)
Assignment status	when feedback is given e.g. planning, draft, submitted (1)
Application	integrated, guided, optional (1)
Urgency	the nature of the intervention (1)
Access	the form of the assignment and its availability to the person giving feedback and the listener (3)
Subject/discipline	professional alignment, academic rigour, etc (5)
Topic	appropriateness of audio for the assignment (3)
Teaching culture	instructive, constructive; social, independent, etc (2)
Feed forward	potential to affect future learning (2)
Alignment	module outcomes (1)
Action required	suitability of the medium to communicate further work (1)
PRODUCTION AND DISTRIBUTION	
Production quality	affected by environment, skills, equipment, time (3)
Duration	determined by an expectation for constructively engaging the student (2)
Timing of recording	the time available to make the recording (3)
Location of recording	home, office, lab, studio, etc (2)
Location(s) of access	PC lab, home, work, commute, gym, etc (3)
Method of distribution	VLE, repository, intranet, email, CD, mixed, etc (2)
Repeatability	opportunity, expectation or requirement for the feedback to be replayed (1)
Size of audience	individual, group, module cohort, year, subject area (3)
ACCESS AND USABILITY	
ICT literacy - tutors	competence and confidence (3)

ICT literacy - students	competence and confidence (4)
Accessibility	legal requirement to provide equivalent learning experience for all (5)
Learning style	not everyone agrees this is important (Coffield *et al.* 2004) (1)
Cohort size	reasonable manageability (4)
Workload and study load	affect of the feedback on other commitments (3)
Student readiness and expectations	ability of students to apply the feedback (2)
Signposting, clarity and structure	the ability of students to follow the message (1)
INSTITUTIONAL CONTEXT	
Policies and procedures	Adherence to, or capacity to affect, relevant policies and procedures (4)
Tools	Availability and reliability of recording devices and software (4)
Technical infrastructure	making, distributing, retrieving, storing (4)
Reliability of systems	Robustness of technical infrastructure and tutor's capacity to reduce risk (5)
Technical support	for producing, distributing and receiving the feedback (3)

Emerging Principles

The following principles for audio feedback design are proposed, drawing upon the experience of practitioners and the literature on effective feedback. Audio feedback should be,

1. timely and meaningful;
2. manageable for tutors to produce and the learner to use;
3. clear in purpose, adequately introduced and pedagogically embedded;
4. technically reliable and not adversely determined by technical constraints or difficulties;
5. targeted at specific students, groups, or cohorts, addressing their needs with relevant points in a structured way;
6. produced within the context of local assessment strategies and in combination, if appropriate, with other feedback methods using each medium to good effect;
7. brief, engaging and clearly presented, with emphasis on key points that demand a specified response from the learner;
8. of adequate technical quality to avoid technical interference in the listener's experience;
9. encouraging, promoting self-esteem;
10. formative, challenging and motivational.

Conclusion

This study suggests that taking a design-led approach to providing feedback may help academics to engage students in their formative development in a meaningful way. This requires the academic to be aware of, and responsive to, the subtle factors that affect their teaching context. Some factors are predetermined and relatively uncontrollable, whilst others provide a creative opportunity for the academic to address local needs.

Digital audio has shown itself to be a flexible medium and one that can have a useful role in facilitating learning, especially given its technical simplicity. Formative audio feedback can take many forms and involve many voices. In most of the cases discussed here it is the voice, and the layers of meaning it can convey, that has driven academic innovation. Good audio feedback can help the tutor engage closely with students despite the prevailing challenges that exist in Education today.

The use of audio feedback (especially approaches that capture conversations) may promote dialologic engagement more generally for the learner by modelling and signalling the social construction of knowledge. The approaches described here demonstrate that audio feedback offers a range of interventional methods on the formal-informal learning continuum through exposure to conversational engagement.

Though this paper has identified a complex set of factors that require academic consideration in the design of audio feedback, the most important message from the evidence is that audio feedback is a flexible tool, able to enrich both the student and tutor experience.

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