

Reconsidering the role of recorded audio as a rich, flexible and engaging learning space

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Audio needs to be recognised as an integral medium capable of extending education's formal and informal, virtual and physical learning spaces. This paper reconsiders the value of educational podcasting through a review of literature and a module case study. It argues that a pedagogical understanding is needed and challenges technology-centred or teacher-centred understandings of podcasting. It considers the diverse methods being used that enhance and redefine podcasting as a medium for student-centred active learning. The case study shows how audio created a rich learning space by meaningfully connecting tutors, students and those beyond the existing formal study space. The approaches used can be categorised as new types of learning activity, extended connected activity, relocated activity, and recorded 'captured' activity which promote learner replay and re-engagement. The paper concludes that the educational use of the recorded voice needs to be reconsidered and reconceptualised so that audio is valued as a manageable, immediate, flexible, potent and engaging medium.

Keywords: audio; podcasting; digital media; media-enhanced learning; user-producer; content; learning spaces

Introduction

Educational podcasting is frequently discussed as a supplementary medium (Bell *et al.* 2007; Copley 2007; Lonn and Teasley 2009) making it irrelevant to many academic innovators. This belies its transformative potential as set out in this paper. As Heilesen says (2010), 'many students experience podcasts as a genuine improvement to the study environment' (p. 1063). There is a need, therefore, to reconsider educational podcasting and reconceptualise it as a rich learning space for student-centred active learning.

Fernandez, Simo, and Sallan (2009, p. 391), having appreciated what can be achieved with audio, concluded that future research should 'examine the differences among the academic uses for podcasting, and how these different uses can be combined on the same course'. This paper presents a case study describing the impact of podcasting as a flexible extension to the existing physical and virtual learning environment capable of accommodating many different types of pedagogic intervention in an undergraduate Computing module.

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Educational podcasting is first defined and a review of relevant literature is presented. These inform a case study of practice. Evidence from the literature, Puentedura's (2014) SAMR (Substitution Augmentation Modification Redefinition) model of how technology influences teaching and learning, and lessons from the case study are used to establish a taxonomy of audio-enhanced learning. This shows how podcasting can facilitate pedagogic change using intended or opportunistic approaches.

Defining educational podcasting

Educational podcasting can be understood as either a technical or pedagogic phenomenon.

Technically speaking, podcasting is the serial distribution of locally generated downloadable digital media episodes, usually audio, via RSS (Really Simple Syndication) feeds to niche audiences of subscribers. RSS incorporates structured information about the podcast channel and the appended items ('episodes'). In this way the RSS feed file can be automatically and regularly checked by the end-user's aggregation software (e.g. iTunes), which triggers the downloading of new episodes whenever they become available.

Alternatively, Lazzari (2009, p. 88) disregards the need for a formal RSS channel,

A podcast is a method for distributing any digital media file, or series of files, over the Internet for playback on portable media players, such as iPods, and personal computers.

Pedagogically educational podcasting is defined differently as,

The finding, making and sharing of the recorded voices of tutors, learners, experts and others as a common space promoting learning through exposition, dialogue, encounter, social presence and enquiry.

Considering assumptions and other research problems

Kirkwood and Price (2013) highlight the importance of challenging assumptions about, and distinguishing between, the pedagogic and technical benefits of innovations in educational technology research. They also say more attention needs to be given to making clear the educational philosophy of papers reporting on innovation; for example, those that adopt teacher-centred assumptions and those that assume a learner-centred view.

Further weaknesses of the literature on technology-enhanced learning, including educational podcasting, concern the inappropriate generalisation of claims and an overdependence on comparative methods: those which involve 'comparing the outcomes from teaching one group (or more) using some form of technology with those of a control group taught by a more "conventional" method' (Kirkwood and Price 2013, p. 538).

The inadvertent making of generalised claims can be a result of authors failing to appreciate the significance of the specific situation in which their studies are conducted. There is, for example, a surprising lack of reference to the idea of signature pedagogies (Shulman 2005) in which disciplinary context is a key factor.

Literature frequently depends on discredited assumptions about learning styles. Waring and Evans (2015) examine the myths of learning styles, Zhang (2015) the cognitive malleability of learners' intellectual styles, and Hattie and Yates' (2013) assert that we are all capable of learning effectively in multi-modal situations where different media are used.

Student inclusion also warrants greater attention in this literature. It is notable that audio, therefore, is often cited as a medium that promotes the inclusion of people with dyslexia who benefit from working with non-text-based media or those who are partially deaf who value being able to playback recordings and listen carefully to classroom activities (MELSIG 2014). Often it is incorrectly assumed that text is adequate for all students.

The incompatibility of technical and pedagogic perspectives

Much of the podcasting literature takes a technical and teacher-centred bias and presents the medium as an opportunity for conveying and supplementing the dominance of the teacher's voice. Alternatively, Pegrum, Bartle, and Longnecker (2015) view podcasting from the position of deep learning, especially where students are involved in 'creative podcasting' or 'learner-generated' podcasting (Dale and Povey 2009; Lee, McLoughlin, and Chan 2007; Middleton 2013).

The techno-centric view ignores the transformative opportunity to engage the learner in different, more challenging ways. This is understandable: the academic must manage the risk of using novel technology, though this diminishes the chance of pedagogic innovation. Bolliger and Des Armier (2013) note that one of the problems with the research in this area is that the student subjects are *also* always novices and their first experience of an active mode of pedagogy often coincides with these innovations.

Sometimes the pedagogic exigency can be so strong that innovation is almost bound to happen. This is the case with the use of audio feedback, its rationale being the need to provide more personal, timely and meaningful feedback to students on their work (e.g. Gould and Day 2013; Rotheram 2007). This rationale clarifies its technical requirement to simply record the voice of the person giving feedback in a way that can be easily returned to the student. The perceived technical complexity of podcasting is mostly absent in case studies on audio feedback where its pedagogic rationale would seem to dispel any associated anxiety of the academic producer.

The technical definition above introduces the idea of serialised episodes. Serialisation can be understood as meaning regular and designed publications released according to a schedule using a particular format and voices (Edirisingha, Salmon, and Nie 2008). However, the pedagogical imperative suggests there is no reason why audio learning materials should be regular in format or schedule. Learning structure is important, but within that materials can be irregular, spontaneous, and delivered according to specific needs, featuring different voices, in different combinations, at different times, for different durations, with different purposes, as opportunities present themselves. Indeed, audio as a medium reflects one of the strongest attributes of the academic voice: its flexibility.

The pedagogic definition describes podcasting as a 'common space'. Control of the space is intentionally ambiguous; there is no reason, beyond tradition, why such

an environment cannot be used and managed by the learner, especially as there is a growing appreciation of personal and socially mediated learning spaces (Dabbagh and Kitsantis 2012).

The pedagogic definition indicates how educational podcasting encourages and values the academic spoken word as an alternative to written media and how it is possible to break away from the constraints of pre-Digital Age education in which written media have dominated learning. Education is theoretically no longer bound to its lecture theatres and classrooms, nor is it dependent on people being co-located, whether they are formally participating in the course or not. Similarly, and importantly from a learner-centred perspective, information, ideas and argument communicated as spoken word can be accessed and reused when the learner determines that doing so is valuable to them, including when the recorded voices they hear are their own.

A review of literature on educational podcasting

Common themes

Studies of educational podcasting have addressed a number of themes: technical methods and barriers; coursecasting or lecture capture (Middleton 2009); learning by listening (Edirisingha 2006); the capacity of the medium to supplement existing pedagogy (Hill and Nelson 2011; McLean and White 2009); the effect of recorded lectures on attendance (Parson *et al.* 2009); the readiness of students to use their personal devices to access podcasts (Atkinson, Buntine, and McCrohan, 2007). All these are discussed by Walls *et al.* (2010) who also highlight other common findings: most students do not know about podcasting feeds and most students use a PC, rather than a portable device to listen to educational media (Atkinson, Buntine, and McCrohan, 2007; Evans 2008; Lane 2006; Lee and Chan 2007; Malan 2007; Morganteen 2006). Rothwell (2008) and Sutton-Brady *et al.* (2009) specifically highlight students' preferences for listening in the informal home setting.

Enhanced learning: supplemented, complemented or augmented?

Much of the discourse on supplemental podcasts assumes lecturing to be the dominant pedagogy and, rather than being pedagogically critical, they are additional and optional. Parson *et al.* (2009) discuss podcasting's capacity to substitute for the lecture experience, finding that additional material is useful, whatever the format, but that university students still perceive lectures to be their main source of learning and that they should not be replaced by online material. Fernandez, Simo, and Sallan (2009, p. 391) conclude that 'podcasting is a powerful tool as a complement to the traditional resources on a course, but not a substitute for them'. They also assert that podcasting increases 'the impression of permanent contact between students and teachers', describing the benefits of this on students' motivation and how it can increase variety in the ways that students are engaged. Mount and Chambers (2008) caution that simply substituting one medium for another is unlikely to have any significant learner benefits unless the fundamental pedagogy is changed.

Discussion about the verisimilitude or reliability of the recorded voice is found in other literature, such as that on audio feedback (France and Wheeler 2007; Gould and Day 2012; Rotheram 2007) in which students particularly value the new proximity they have to their tutors and peers and how spoken word reduces misinterpretation of

feedback (Sipple 2007). This proximity establishes a different sense of social presence and interpersonal connectivity (Harrison *et al.* 2014; King, McGugan, and Bunyan 2008; Lunt and Curran 2010; Nortcliffe and Middleton 2007). The use of audio is expressed as redefining academic practice in some literature on audio feedback (Gould and Day 2013; Laughton 2013).

Bolliger, Supanakor, and Boggs (2010) researched the effects of various podcasting pedagogies including introductory, lecture and supplementary podcasts and found that each type can positively impact learner motivation and attentiveness. Popova, Kirschner, and Joiner (2014, p. 337) say that, 'If podcasts are thoughtfully integrated into the existing and still prevailing use of lectures, they have the potential to enhance deeper levels of learning, especially if they involve students in carrying out epistemic tasks'.

Methods for learner engagement

Assignments

Sutton-Brady *et al.* (2009) discuss the production of short-format podcast episodes in setting and supporting assignments. They describe how the assessment task, guidelines for undertaking the task, and feedback on the task can all be delivered using a common podcast channel.

Authentic voices

Rothwell (2008, p. 131) highlights how 'podcasting offers the possibility of building a database of authentic "voices," rich in meaning potential, constructed and managed by students in collaboration with tutors—while Downward *et al.* (2008) discuss how students can gather authentic voices and sounds on field trips.

Preview and review

Preview techniques (Aliotta *et al.* 2007; Bell *et al.* 2007) and pre-visit techniques (Middleton 2010) have a similar purpose to the student-generated techniques discussed by Lee, McLoughlin, and Chan (2007) who describe how media can be used to engage and prepare the learner before they meet in person.

Popova, Kirschner, and Joiner (2014) describe their use of 'primer podcasts' to stimulate prior knowledge activation and self-questioning. Audio is used to help students better understand new concepts, with epistemic questioning encouraging deeper learning in their integrated view of podcasting. They found that 'explaining core concepts and providing structure before a lecture gives students an opportunity to make sense of what they learn' (p. 331). This is recognisable as a 'flipped classroom' approach (Bergmann and Sams 2012).

Audio can be used to capture either the essence or the detail of a situation as well as key 'take away' points. Brittain *et al.* (2006), Evans (2008) and Parson *et al.* (2009) discuss whether the recording of lectures is able to support exam revision.

Others (Copley 2007; Frydenberg 2008; Guertin 2010; Middleton 2010; Rothwell 2008; Rushton *et al.* 2015) discuss alternative techniques such as audio summaries which involve students taking responsibility for summarising significant

events or readings. Summarising is a valuable learning technique and the sharing of the recordings adds a valuable social dynamic.

Lonn and Teasley (2009) use the term 'review' to embrace learner reflection and revision techniques, methods that also provide access to content for those who missed the original event. Short audio revision notes (Middleton 2010) in which the listener is encouraged to develop what they hear by writing their own response, emphasises cognitive transference through the change in medium. Rothwell (2008) used a similar approach and Guertin (2010) takes a 25-question quiz approach to audio revision.

Learner-generated podcast assignments

Bolliger and Des Armier (2013) evaluated the integration of student-generated audio and found that it fostered student engagement and involvement, assisting them in effectively connecting and communicating with peers and increasing their learning. When used well, the recorded voice enriches learning by enhancing a feeling of social presence. This was also noted by Dale and Pymm (2009).

In four studies at two universities McElearney and Middleton (2013) found that students relished podcast assignments which required them to work in different and more creative ways. Most of the students valued the process of making podcasts together as a viable learning activity, with several being very enthusiastic about working with digital media. The change and challenge that the media affords and the capacity for group assignments to develop the students' confidence, creativity and critical abilities were appreciated. McLean and White (2009) and Smith and Sodano (2011) also found that the iterative process involved in student-generated audio assignments promotes learner self-assessment.

Lee, McLoughlin, and Chan (2007) found that student podcast production offers a shared context that supports learner creativity and collaborative negotiation of meaning, thus underpinning knowledge creation. Student-generated podcasting reduced anxiety and heightened engagement through the co-production of background material. McLoughlin, Lee, and Chan (2006, p. 39) noted that 'placing students in the roles of producers encourages them to engage in metacognitive thinking about learning, as they create podcast episodes'. Lee and McLoughlin (2007, p. 5) discuss the benefits of user-generated content in the context of education with students acting as both 'producers and consumers ("prosumers") of knowledge, ideas, and artifacts', and Dale and Povey (2009) describe how podcast assignments were found to be highly motivational, developing students' theoretical understanding, practical skills and employability.

Audio as an autonomous and smart medium

Downward *et al.* (2008, p. 69) value 'the flexible and adaptive nature of podcasting as a communicating and integrating tool that can be readily developed by staff and students'. This flexibility, when combined with the ubiquity of smart and portable devices, indicates the range of possible pedagogic podcasting applications. This has informed investigations, for example, into how students can gather significant conversations and how such technologies help support idea generation and learner reflection in formal and informal situations (Middleton and Nortcliffe 2009). Accounts of 'smart learning' and BYOD (Bring Your Own Devices) for learning continue to change our learning context (Middleton 2015).

Audio is a flexible medium and simple to use and produce. It is also immediate and responsive: the ubiquitous microphone being adept at capturing ideas, conversations, discussions and insight (Nortcliffe, Middleton, and Rossiter 2013).

Module case study

The tutor aimed to establish an accessible, responsive and adaptable extension to the existing physical and virtual learning environment by incorporating the voices of the tutor, students, and invited or found external contributors.

Context

The module's aim was to develop practical computing skills (AJAX powered Web 2.0 websites) alongside the theory and application of creativity and innovation amongst final year undergraduate Computing students. It had a cohort of 13 students attending a 2-hour class each week and ran over two semesters led by two teachers. One had responsibility for the practical elements and the other (the author) for the theory. An enquiry-based learning approach was used (Kahn and O'Rourke 2004). Topics included the management of personal and professional identity, creativity and innovation, and methods for designing and implementing online media.

Tutor and class recordings were created using a portable MP3 recorder or a smartphone and posted directly to the module's Blackboard site during class or shortly after. Other unedited tutor recordings, such as briefings, feedback and revision notes, were loosely scripted and produced at home or in a meeting room. Three interviews were conducted with external contributors for which short introductions were recorded with minimal editing. Later episodes featured students' own digital story assignments with other episodes being made up of recordings from other podcast channels and websites.

Establishing a discursive learning space

A 'module ethos' document was produced in Week 1 by the tutors with the students, drawing upon an ethical framework (Regan *et al.* 2011). This helped to establish the discursive, enquiry-based learning approach.

The classes were conducted in a computer lab. Its fixed layout and distracting PCs led to students being asked to wheel their chairs to the 'teaching' area of the room where they formed a circle which helped to focus class discussions. A recorder was either placed at the group's centre or passed around as a useful tool for seeking student contribution. Students responded well to the situation that was created. These techniques were used carefully with the tutor being sensitive to recording those students who appeared to find the approach difficult.

The recorder's portability was notable for accommodating the diverse recordings.

Analysis of episodes using a measure of pedagogic innovation

40 episodes were distributed through the module podcast channel which can be analysed using four innovation categories, each with a descriptive hypothesis.

New activity

Hypothesis: audio podcasting resulted in new forms of learning activity.

The podcast channel was used by the tutor as a reflective space, especially during the earlier formative stages of the module. In Week 1 the tutor reflected on the development of the module ethos and an in-class SWOT (Strengths, Weaknesses, Opportunities and Threats) Analysis activity. In Week 3 the entry for the episode description reads, 'Just thought I would capture a few thoughts on how the Video Challenge is going. Hope this is helpful'. The audio content and its description were conversational and intended to establish a facilitative tone; earlier discussion had revealed some reticence amongst the Computing students to talk.

Four topics were introduced during the module by raising epistemic questions and presenting ideas in a monologic form.

Episode four, entitled 'Responsible Producers', is an example of where the tutor brought in external 'voices' into the learning environment; people who would otherwise not have been heard. The recording features an interview with a professional acquaintance who shared her own experience of ethical conflict in her role: a rich and valuable story helping to bring the module topic to life. This opportunistic recording created a powerful reference point illustrating dilemmas associated with producing user-generated content.

An engaging PowerPoint on the topic of 'The Future of Employment' was found on the presentation-sharing website Slideshare. The tutor recognised the value and authority of the original source, but wanted to critique some of the ideas and decided to produce a spoken commentary on the presentation that worked in the same way that a director's commentary works on a movie DVD.

Connected activity

Hypothesis: audio podcasting resulted in connected activity, often involving people not directly associated with the module or the university.

Connections were made on several occasions between module topics and news in the world beyond. Several episodes came from other podcasts and radio programmes published while the module was running:

- A podcast by an online newspaper about Web 2.0 'mash ups' in the real world featuring an interview with Sir Tim Berners-Lee;
- A US podcast discussion about online identity, which connected with one of the assignments;
- A 45-minute panel discussion from an educational technology podcast which presented alternative perspectives about online identity;
- A radio programme about the German motor industry, which addressed the topic of 'Creativity and Innovation'. Linked from Blackboard, students were asked to listen prior to attending the class that week.

Though this category may appear to be about supplementary content, the approach is better understood as an integrative 'flipped classroom' model because the recordings provided the context for in-class activity and assignments.

Relocated activity

Hypothesis: audio podcasting resulted in a relocation of activity temporally and spatially.

Twenty-two of the episodes can be categorised as being relocated activity. However, within this there are 12 Audio Revision Notes, three pieces of Generic Audio Feedback, and four student presentations. Without the podcast channel, these activities would have necessitated more class time.

Audio Revision Notes lasting 5 minutes were produced by the tutor in the latter half of the module to help students distil their personal experiences of earlier activities. Each recording listed five key points for a topic. Students were advised to note each point in writing and develop it according to their own experience and research. In this way subsequent playback of these audio notes was intended to trigger recall of the learner's own knowledge.

Generic Audio Feedback was given on all three assignments at the earliest opportunity. This enabled key points to be made while the students were still close to their assignment and to inform subsequent activities. Students were asked to compare their performance with that of their peers in relation to the points raised.

The last assignment required student groups to produce podcast presentations lasting less than 2 minutes as a way to present their findings from their enquiries in a non-written form for the benefit of a wider audience. This complemented their written project report. Relocation here developed fluency by moving reporting from one medium to another.

Other episodes where relocation characterised activity included:

- an interview with an expert which could not happen in class for logistical reasons;
- a topic presentation for which there was no class time available;
- a book review.

Captured activity

Hypothesis: audio podcasting resulted in re-engagement with activity that was previously ephemeral in nature.

Earlier work had revealed how recording classroom activity can be valuable where learners are distracted by anxiety or engagement in classroom activities (Nortcliffe, Middleton, and Rossiter 2013). Recording allows the learner to reflect on their own contributions and to pay closer attention to contributions and responses made by peers. Furthermore, it is possible that listening back to discussions allows the listener to make further connections to the original discussion.

Two of the podcasts took the form of Audio Assignment Briefs which were produced in class by the tutor who expanded on points and answered questions about the briefing document. Sutton-Brady *et al.* (2009) discuss a similar method. It was critical to properly establish the basis for the assessed tasks, yet class attendance was uneven. The recording allowed each learner to reconnect with it when it became more meaningful for them. Therefore, relocation here means a user-defined spatial and temporal relocation.

At another point, students were involved in creative classroom problem-solving activities. Their contributions were recorded, capturing both the fun and the outcomes of the exercise.

Conclusions

Lecture recording supplements and reinforces the existing pedagogy. Barr and Tagg (1995, p. 25) note however,

One early sign of a paradigm shift is an attempt to use the tools and ideas of a new paradigm within the framework provided by the old, or to convey information intelligible in the new paradigm through the channels of the old.

It is now clear that the recorded voice can be used to transform pedagogy. It can be used to share information, experience, ideas, arguments, feedback, and to promote discursive engagement. Audio establishes a new type of learning space: one full of social presence, unconstrained by time or place. It provides an additional space which *can* be used to supplement existing pedagogies but, more importantly, it can also mediate new types of learning activity, develop and relocate existing activity, and support the review of class activity. It is a space for listening and speaking, enquiry and co-production.

Such interventions can extend the nature and value of existing activity, temporally and spatially, and should encourage innovators to confidently discover new opportunities for student-centred active learning as outlined in the Audio-Enhanced Learning Taxonomy (Table 1).

Future research will continue to develop thinking about how academics and students can use the recorded voice by exploring the boundaries of the formal learning space to foster belonging.

This paper has demonstrated how the educational use of the recorded voice needs to be reconsidered and reconceptualised so that audio is valued as a manageable, immediate, flexible, potent and essentially engaging medium.

Table 1. Audio-enhanced learning taxonomy with reference to SAMR.

Innovation	Description	SAMR
1. New activity	Use of the audio results in new forms of learning activity.	<i>Transformation-Redefinition</i> – allows for the creation of new tasks, previously inconceivable
2. Connected activity	Use of the audio results in an extension to activity, often involving people not directly associated with the module or the university.	<i>Transformation-Redefinition</i> – allows for the creation of new tasks, previously inconceivable
3. Relocated activity	Use of the audio results in a relocation of activity temporally and spatially.	<i>Enhancement-Modification</i> – allows for significant task redesign
4. Captured activity	Use of the audio results in re-engagement with activity that previously was ephemeral in nature.	<i>Enhancement-Augmentation</i> – acts as a direct tool substitute, with functional improvement

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A. Middleton

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