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Supporting Student Learning with Digital Audio: A Low-Tech Approach

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ABSTRACT

Advances in technology have made the use of digitized audio, often in the form of podcasts, more popular in recent years. The MP3 compression file format for such audio has become a defacto standard and the associated MP3 players are now ubiquitous. In the domain of eLearning, audio id perceived as a low-tech approach when compared with video technology. However such an approach can be useful as firstly, such audios can support mLearning as they can be listened to anywhere, and secondly, they are easy to produce for technology challenged instructors. This paper uses a teaching and learning framework as a basis for discussing how audio can support learning. It outlines some practical issues for instructors and students and provides suggestions for making the best use of audio. Some of the feedback obtained from online surveys that has been carried out with students at a university in Australia is utilised to support the discussion.

INTRODUCTION

The production of digital lectures by using audio or screencasting has been taking place for over a decade (e.g., Garner, 1997). A screencast is a video recording of the actions on a user's computer screen, typically with accompanying audio (Educause, 2006). Many universities are now taking advantage of the improvements in both hardware and software to encourage instructors to make greater use of digital lectures in the belief that this will help students in their learning. This paper discusses the student support provided by the simpler, low-tech option of just digitising the audio stream of a lecture. With reference to a framework of teaching and learning, the paper also indicates where audio can provide useful learning support beyond digital lectures. Additionally, feedback from an online survey that has been carried out with students at a university in Australia is used in the discussions together with practical suggestions for instructors.

ONLINE SURVEY

Fifty-three students who were undertaking an MBA unit in Information Technology at an Australian university were surveyed to determine their experiences using audio support in their learning. The survey instrument is shown in appendix A. The most useful feedback that was obtained from the survey came in the free text comments of questions eight and nine.

AUDIO PRODUCTION

The use of digitized audio streams and files has become popular because of the ability to compress audio into formats such as MP3. This has been driven in part by the music industry and, more recently, by the availability of audio podcasts and the associated subscription services via RSS (Really Simple Syndication). Students are therefore comfortable with MP3 files and such players have become ubiquitous, whether as a standalone device or as a feature within a mobile phone.

Low cost voice recorders are now available that allow voice recording directly to formats such as MP3 and hence this has become an easy way for instructors to produce audio for use by students (e.g. Olympus, 2008). The recorders can usually be directly connected to a computer's USB port in order to copy audio recordings to a computer's hard disc for subsequent uploading to the Web.

A TEACHING AND LEARNING DESIGN FRAMEWORK AND THE USE OF AUDIO

A generic teaching and learning framework has been proposed by Oliver & Herrington (2001) and this framework is heavily influenced by their belief that constructivism best describes how learning takes place. It comprises three critical elements, these being: learning resources (content); learning tasks; and learning supports as shown in figure 1.

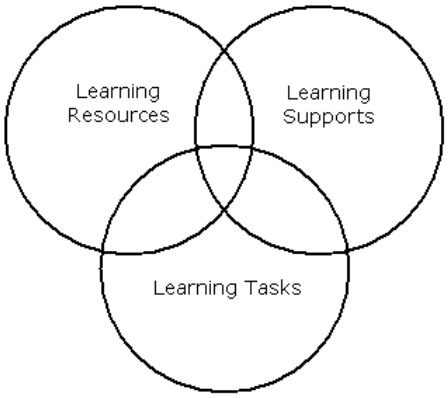

Figure 1: Generic Teaching and Learning Framework

Learning Resources

Learning resources provide the content for a course and can be thought of as the materials which are used to help students construct their knowledge and meaning with respect to a domain of knowledge. In most units of study, the major learning resources comprise a textbook and lectures, the latter usually having an associated set of digital slides most often in PowerPoint (Microsoft, 2008). It is in this area that the majority of screencasts have been produced with institutions providing infrastructure to support the production of such iLectures (e.g. Lectopia, 2008). Many studies show that students believe that such iLectures improve their learning experience and provide greater flexibility with the capability to study anytime and anywhere (e.g., Phillips et al, 2007; Boffey et al, 2006)).

Using such specialised infrastructure to produce digital lectures means, that without access to such teaching rooms, many lectures cannot be digitised. However a cost effective options is to produce digitized audio streams of lectures. The author has produced such digitized audio for all lectures in an MBA unit at an Australian university and posted them to the university's content management system. A high end portable voice recorder was used which enabled the capture of audio directly to MP3 format. The advantages of recording lectures in this way include: reduced file size; the ability to play the audio on a portable player; the instructor being able to move freely around a lecture theatre; a low-cost solution; and it is easy to capture student questions. The disadvantages include: the instructor needs to remember to always indicate verbally which slide is being discussed; and visual aspects such as the instructor pointing at certain sections of a slide are lost.

In the survey of 53 students, 39% indicated that the recordings were very helpful, and 45% indicated that they were quite helpful. Some lecturers have concerns that student attendance might be reduced because of such supports, and 3% of students indicated that they very often missed lectures because of the availability of recordings, and 52% indicated that they sometimes missed lectures. These results might suggest that in order to "encourage" attendance, such recordings should not be utilised. In discussions with students on this matter, students who regularly attended made the very valid point

that they should not be penalised by the withholding of a valuable learning resource because other students chose not to attend. This is an interesting area for debate.

Other student feedback from the survey indicated that they preferred the audio format to screencasts for a lecture that just utilised PowerPoint slides. This was found to be somewhat surprising, however one of the reasons given by students was that it enabled greater flexibility. For example, some students would print out the PowerPoint slides and load the audio to their portable music players. They could then review a lecture on a bus or train on their journey to or from the university. A selection of comments from students concerning audio lecture recordings included:

- I can study anywhere, anytime by listening to an audio recording via my mp3 player;
- I missed a few lectures (not BECAUSE they were recorded) and this was an ideal way to still get all the information;
- Sometimes I cannot understand clearly because of language. So the audio recordings are very useful for me to review the lecture;
- If I didn't understand something during the lecture or I was temporarily day dreaming when the lecturer said something important, then I can refer to the audio;
- It helped me concentrate more on the important notes or comments given by the lecturer and helped my understanding the case studies;
- English is not my first language so recording is very useful for me;
- Even if I missed a lecture, I would probably read a textbook rather than listen to a recording because listening to audio can be very time consuming; and
- Can be improved by always indicating the slide number while recording (if possible).

Students also indicated that they would become frustrated if there were long pauses in lectures (i.e. the lecturer pausing). One good side effect of using a digital voice recorder is that the majority of recorders can be set to "voice activation" resulting in the elimination of such pauses.

In conclusion the audio lectures were clearly popular with international students where English was not their first language. Also students found them helpful in clarifications of more difficult concepts. However there was an indication that it was time consuming to listen to a lecture again and that the instructor should help in slide navigation by clearly stating the slide that they are "talking to".

Learning Tasks

Learning tasks comprise the second element of the design framework and play a fundamental role in determining learning outcomes (Wild & Quinn, 1997). The tasks determine how learners engage with the resource materials and well designed activities should be active and engaging.

The tasks form the main basis of most units of study and they ensure that students actively engage with the learning resources in order to complete the tasks. Tasks are usually set by instructors in text format and, dependent upon the clarity of the textual description, will elicit queries from students as to what is actually required by the instructor. The author has found that the production of a short audio of a verbal description of the task helps reduce student queries, and often fears as to the task requirements. Such audios enable an instructor to easily embellish the textual description, are easy to produce, and can quickly be added to a content management system such as Blackboard (Blackboard, 2008). A comment from a student concerning such audios was:

- I liked to listen to you tell me what the I must do when you explained the unit plan;
- As an external student I found the explanations by the lecturer of what was wanted in the second assignment really helpful.

Students can also be required to "talk through" their solutions to tasks thereby having to consciously think about why they solved problems in particular ways; or to discuss case study analyses. This ensures that students have had to go through a process of reflection and instructors gain value from such student audios as they are able to determine what students have learnt and gain insight into the mental models of the students. There are many freeware tools that allow students to make such recordings on their computers, a popular one being Audacity (Audacity, 2008)

Learning Supports

Learning supports are the third element of the instructional design framework and can be thought of as the supports required to help guide and provide feedback to learners in a way that is responsive and sensitive to learner individual needs (McLoughlin & Oliver, 1998). In "traditional" settings such supports have been provided by actively involved teachers (Laurillard, 1993) whereas in technology based learning environments, such supports are often known as 'scaffolds' to help learners during their knowledge construction process (Roehler & Cantlon, 1996).

In order to succeed with the assigned learning tasks, students need to engage with learning resources. However, as in all learning, there are times when students need help or advice and this is where the third part of the framework, learning supports, is utilised.

In face to face lectures and tutorials, a student might gain learning support by listening to the answer to a question that they ask their instructor. A useful side effect of the instructor's response is that other students in the group who did not ask the question, also gain support vicariously. Such vicarious support can also be gained using audio (e.g., Cox et al, 1999). The first example is in the audio recording of a lecture or seminar in which a student asks a question. The response to that question can be recorded thereby providing vicarious support. A second example is the use of frequently asked questions (FAQs). Students can normally learn vicariously by "looking" at answers that have been provided to previous student questions, however it is easier in many cases for an instructor to record short audio answers.

Comments from students concerning the use of audio as a learner support included:

- I liked to listen to your replies to questions I was afraid to ask; and
- In some of the audios it would be helpful if you could repeat the questions from the students before replying as it was hard to pickup from the audio.

The first comment demonstrates that vicarious learning can take place for students who are too shy to ask questions during lectures and seminars. And the second comment suggests that the author's audio recording technique probably needs improving. The author has a small microphone that he attaches to his shirt and is able to move around a lecture or seminar room. However capturing student questions has clearly not always been done well.

OTHER STUDENT FEEDBACK CONCERNING THE AUDIO RECORDINGS

Other feedback from students concerning the use of audio was as follows. Firstly 86% of students indicated that they had listened to the audio on their MP3 players. Of those, 21% stated that they did this "very often" whereas 65% stated that they did this "once or twice". Student comments included:

Student Comment	Discussion
I often use it on the way of university. It is very helpful for me on and hope to others also. There should be audio for all lectures.	This demonstrates the usefulness of the portability of MP3 audio as the student would listen to recordings when commuting to university. And of course, having appreciated the usefulness of a resource, the same

	student makes the suggestion that all units of study should use audio.
I can do several things while I listen to the audio.	This reflects the multitasking abilities of generation X and Y students!
I attended every class so I didn't really make use of the audio however I feel comforted by the fact that if I did need to listen to the class it is available. For the small amount of resourcing it requires I think it is a valuable tool	This indicates that students like the comfort that their studies will not be adversely affected should they have to miss a lecture. And as pointed out, the recoding of audio requires a low-level of resourcing on the part of the instructor.
I never used the audio, because I never missed the class, but I think when I am preparing from exam it will be helpful	This shows that the recordings might be used as a resource to help revise materials before examinations.

SUGGESTED GUIDELINES FOR PRODUCING LEARNING RESOURCES

From the instructor's experience in preparing and utilising audio recordings together with the student feedback, a set of guidelines has been produced. These are as follows:

- Repeat student questions as they might not have been clearly recorded.
- When "talking to" a PowerPoint slide, state the slide number to give audio navigational cues for students.
- Ensure that such a voice recorder can produce audio in MP3 format and can directly upload to a computer via the USB port. This will reduce instructor time.
- Produce short audio recordings to clarify the details of student tasks.
- Where possible, include a requirement in a task for students to create an audio so that they can exercise reflection and higher order thinking. Students can utilise available freeware for this purpose.
- Consider using screencasts and audio for feedback to student assignments.
- Make use of such feedback as a learning resource / support in subsequent semesters for other student cohorts. For example, an instructor can talk through a student essay or report and post this to the Web.
- Create short audios as answers to certain student questions in areas of conceptual difficulty. Some might be able to be used as answers in a "frequently asked question" list.
- A podcast can be used in a task requiring students to listen and answer questions. There are now many excellent commercial podcasts available.

CONCLUSIONS

Improvements in technology have enabled instructors to quickly and easily produce digitized audios and podcasts. This paper has attempted to demonstrate how the technology can be used to produce not only learning resources, but to also help in the areas of learner tasks and learner supports. The author advocates the use of "low-tech" solutions as, although many universities are equipping certain rooms with specialist video recording equipment, not all instructors have access to and can therefore make use of such rooms. The production of technology supported resources, tasks, and supports is more likely to become pervasive with "low-tech" solutions. The author has given several workshops to fellow lecturers on the use of audio recordings to support learning. Feedback has been very positive as many lecturers are clearly interested in a simple low-tech system that they can take anywhere and that would not become a burden to them and not increase their workloads.

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Appendix A
Survey: Audio Recording of lectures

The lectures have been recorded this semester. Please answer the following:

1. What is your gender? **Response Required**

- ○ Female
- ○ Male
- ◉ No Response

2. What is your age? **Response Required**

- ○ 18 - 25
- ○ 26-35
- ○ Over 35
- ◉ No Response

3. What Internet access do you have at home? **Response Required**

- ○ Broadband
- ○ Dial-up Modem
- ○ None
- ◉ No Response

4. How helpful to your learning were the audio recordings (mp3 files) of lectures? **Response Required**

- ○ Very helpful
- ○ Quite helpful
- ○ Little help
- ○ None
- ◉ No Response

5. How often did you use the audio files on an mp3 player? **Response Required**

Very often
Once or Twice
Never
Not applicable as I do not have an MP3 Player
No Response

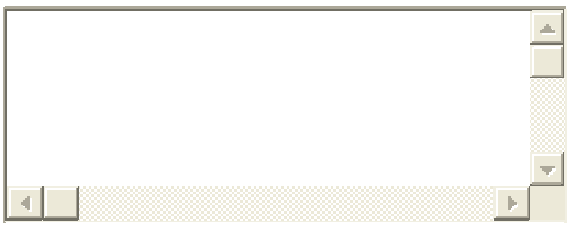
6. Where did you mainly use the audio files? **Response Required**

At home
At university
On the way to or from university
Other
Not applicable as I never used the audio files
No Response

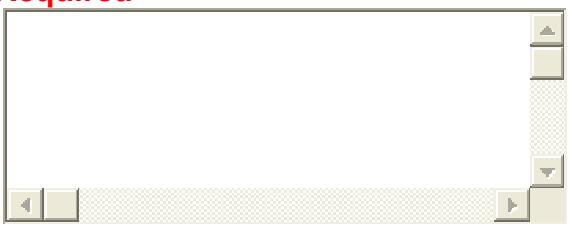
7. How often did you miss lectures because I recorded them (do not worry - you will not get into trouble!)? **Response Required**

Very often
Sometimes
Never
No Response

8. Please write a comment about why you found the audio recordings useful (assuming that you did!) **Response Required**



9. Please suggest how the audio recordings could be improved. **Response Required**



Click here to submit survey | Click here to reset responses