A continuous improvement strategy for undergraduate teaching in higher education

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***Abstract**: This paper discusses a continuous improvement strategy drawing heavily on video and multi-media technology. The first step in the strategy is the routine video-taping of lectures from media-equipped lecture theatres (MELTs). Once these lectures are video-taped and digitized, they can be distributed to students via the web and CDs. Moreover, the videos give the lecturer the opportunity to watch his/her own presentations. It can be particularly effective for the lecturer to view the videos just before the corresponding class is to be given again the following year. This viewing serves as very useful preparation and enables the lecturer to see what can be improved from last year. Re-recording of the lecture incorporating these improvements enables a cycle of "continuous improvement" to be achieved. The strategy is currently in use by the author at QUT and is proving very successful.*

***Keywords**: videos, multi-media, continuous improvement*

Introduction

A number of studies have been conducted to see if students learn as well from videos as they do from live lectures. The studies have shown that students actually learn better from videos (eg. Stone, (1987) and Walker and Donaldson (1989)). This is possibly because they can watch the videos at their own pace and review material as often as they want. Additionally videos cater to students who learn effectively from either audio or visual cues [3]. Given the effectiveness of video based learning, it would be convenient if one could devise a continuous improvement strategy which involves videos, and possibly other multimedia technology such as the internet and CDs. This paper proposes such a strategy. Early feedback indicates that the strategy is very effective.

The Continuous improvement strategy

The strategy proposed in this paper is a multi-stage strategy, with the essence of each of the stages being detailed in the following sub-sections.

Stage 1: "On-the-fly" video recording of lectures

Many lecture theatres in higher educational institutes throughout Australia are equipped with video projection facilities. That is, the visual content of a computer screen or of a document camera can be projected onto a large screen so that the students can see it. It is a simple matter to connect the output from such a projection system to a video camera input and

effectively "record the lecture live". (The audio connection to the video camera can be obtained either directly from one of the lecture theatre output terminals, or by using a simple conventional tape-recorder and extracting the "line out" connection while the tape recorder plays in the record mode). The set-up and recording is such a simple procedure that it can be done by the lecturer at the start of each lecture. The lecturer need only be equipped with a video camera (complete with the camera's audio-visual connection lead) and possibly an audio tape recorder. Some brief instructional training on setting would probably be needed also.

The recording of the lecture can, of course, also be done by recruiting a professional cameraman, but at much greater cost. The procedure described in the previous paragraph can be done very cheaply – only a video camera and possibly an audio tape recorder are required. Many schools and departments in higher educational institutions have these available for loan already, or can purchase them quickly. Because of the low cost of this "self-recording" option, the lecturer can choose to tape every lecture they give. Furthermore, the decision over what is recorded is much more firmly under the lecturer's control with self-recording. He/she can start or stop the recording at any time with a press of a button on the video camera. He/she can even record some clips of his/her face by doing a quick swivel of the document camera.

Stage 2: Digitisation and compression of lecture videos

Modern technology has finally moved to the stage where video capture and compression is trivial and fast. All that is required is a "firewire" capture card costing about $60, and an operating system such as Windows XP. Many personal computers are routinely equipped with this type of card and operating system. The "Windows Moviemaker" software resident in Windows XP can be used to capture and compress videos, and if necessary edit them. The time to realize the capture and compression of a video (assuming no editing is required) is often only marginally more than the time to play the video tape through to completion.

The size of the compressed video files will vary depending on their length and quality. If the "Medium Quality" option in Windows Moviemaker is used then a one hour video would occupy about 50Mbytes of disk space. The "Medium Quality" option is adequate provided that there is not a lot of fast moving detail in the video. If the Medium Quality option is found to be unsatisfactory then the "High Quality" option can be used. With such an option a one hour video would be about 100Mbytes in size.

Stage 3: Distribution of compressed video lectures to students

Once the videos are compressed they can be exported to the web and/or CDs very quickly. A streaming server will be required for web access, but many higher educational institutes now have these set up. Because of the fairly high bit rates used to build the video files the students cannot watch them from a 56Kb/s modem. Effective viewing requires either a suitable local area network or a modem with a bit rate in excess of 256Kb/s.

CDs can also be burned quite quickly and made available to students for either an overnight or three hour loan. This loan enables students to copy the CD; once students have a copy they can burn copies for friends and so distribution can be achieved quite rapidly.

Stage 4: Obtain student feedback and edit videos

In any continuous improvement strategy for teaching and learning it is imperative to obtain student feedback. Much of this feedback can be informal, but it is also good to have

organized surveys to find out 1) how well the process of video production and distribution was received, 2) if there were any errors in the videos, 3) any suggestions on possible improvements. The informal student feedback can be obtained throughout the semester, but the formal surveying should be done either just before or just after exams.

Clearly, if any errors are found, the videos need to be edited before making them available to next year's students.

Stage 5: Prepare for the current year's classes by watching the videos from the previous year

All good teaching requires thorough preparation. One very effective way to prepare for classes is to watch the lecture videos made the previous year. This has two benefits. Firstly, it enables a quick way to revue the material which needs to be covered and to reconsider the way that the material should be presented. Secondly, it provides an invaluable opportunity to see how well one's explanations come across. That is, it gives the lecturer an opportunity to see the lecture the way the students would have seen it.

Repeat the cycle from Stage 1

After having watched the videos of the previous year's lectures, one is likely to have many ideas about what worked well and what did not. The new lectures are delivered with the necessary improvements.

Evaluation of the strategy

Student feedback

The strategy outlined in Section 2 is currently being trialled in the area of "Digital System Design" in the School of Electrical and Electronic Systems Engineering at QUT. The author is presently taking this subject for the second consecutive year (this year being 2003). The lectures from 2002 were all recorded as per the strategy of Section 2. During the first year of lecturing this subject there was *no* positive written feedback from students. On the contrary, there were two formal complaints to the "Staff Student Liaison Committee". There were also several informal complaints made to the lecturer. The lecture videos were modified in accordance with the complaints received. These videos are now being used to assist with lecture preparation, and as a starting point for creating new/revised videos. The feedback so far has revealed astonishing improvements when compared to last year. Two very positive emails have been spontaneously sent by students, commenting on the quality of the lecture presentations. A number of other positive comments have also been made by students, making particular reference to the benefits of having well organized videos to assist them in their study. A standard QUT "Student Evaluation of Teaching (SET)" survey was conducted recently. (The survey questions can be found at https://www.talss.qut.edu.au/talss/STAFFONLINEGUIDES/gen/index.cfm?fa=displayPage&rNum=17094). 24% of students rated the overall lecturing to be very good, 54% rated it as good, 16% viewed it as satisfactory, while 5% rated it as poor. None considered it to be very poor. Unfortunately the spontaneous written comments from students are not yet available. When they become available it will be interesting to see how many of them comment on the usefulness of the videos.

Personal reflections

The author has found the proposed strategy to be remarkably helpful. Preparation is greatly enhanced by watching last year's videos. Watching one's own presentations is also very

revealing; many flaws in the delivery become immediately apparent, and provide a strong motivation for improvement. Making lecture CDs available to the students has been very much appreciated by the students and appears to be increasing their comprehension.

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