Recording lectures as a service in a service course

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Abstract

Courses for non-statistics majors (service courses) play an integral role in teaching statistics and pose some unique challenges. In these courses, students are often undermotivated on the one hand while on the other hand the syllabus frequently is overly crowded. In this manuscript we target the issues arising from the latter problem by making use of technology. The use of screen capture, a fast and easy way of recording lectures, is discussed through an example of an introductory statistics course for first year biology students at Lancaster University. Student feedback on the use of these recordings is discussed.

1. Introduction

Service courses play a vital role in teaching statistics and frequently are viewed as particularly challenging courses to teach (Symanzik and Vukasinovic, 2006). In contrast to classes designed for statistics majors, these courses have high enrollment, a syllabus that covers a wide range of different topics in statistics in a short time and are attended by students that often dislike or fear mathematics and statistics.

The high pace of the lecture leaves many students struggling to achieve a satisfactory grade and evenmoreso prevents them from thoroughly understanding the concepts behind the methods as often only step by step algorithms are remembered. While a possible solution to this dilemma would involve increasing the number of lectures or decreasing the material covered, it is often not feasible to do so. As an alternative, the use of a simple, video based, learning support tool will be discussed in this note.

Videos have been used extensively in higher education in the past. In Statistics, for example, Rubin (2007) discusses the use of videos as a source of data, Thabane et al. (2008) record consulting sessions for reviewing purposes, Biesterfeld (2001)
shows clips of a TV show to familiarize the students with the show which then forms the basis for some statistical exercises. The most common use of videos in statistics classes, however, is for distance learning courses (e. g. Stephenson, 2001; Evans et al., 2006; Godden, 1998) which have been shown to be equivalent or even superior to the traditional lecture format in numerous studies (e. g. McLaren, 2004; Phipps and Merisotis, 1999; Thirunarayanan and Prez-Prado, 2001; Stephenson, 2001).

All applications of videos in teaching statistics described above either aim at enhancing the experience of students in the classroom and improve students learning or to replace in-class lectures entirely. A slightly different approach to completely replacing the traditional in-class courses is taken in so called 'hybrid' courses (Ward, 2004; Utts et al., 2003), in which the in-class contact time is reduced and replaced by some distance learning component. The reasoning is that these courses offer the convenience of distance learning tools while allowing for the comfort of personal contact.

In this manuscript we discuss the use of screen capture, an easy to use technology to record lectures, and our experiences with it. The traditional lectures are recorded using screen capture and students are given access to these recordings in order to provide an additional learning aid and a tool for reviewing. This idea is briefly discussed in a series about 'supporting students with disabilities' in Ball (2008), but we believe that the benefits extend much beyond those students. The approach taken differs from distance learning and 'hybrid' courses as videos are used in addition to rather than instead of traditional lectures. It is also different from courses in which a cohort of students takes the course in-class while another cohort watches recordings of those lectures at a distance as usually neither cohort has access to both the live-lecture and the recordings.

In the following section a first year biology course is described in which the lectures were recorded using screen capture, before details on the technology used are given. The results of two student feedback questionnaires are then provided in section 4 before we conclude with a short discussion.

2. A statistics course for biology students

The course discussed is held at Lancaster University, a university with about 10,000 undergraduate students in the North-West of England. The class 'Research methods, Analysis and Ethics', is a mandatory course for first year biology students running once a year and covers experimental design, descriptive statistics, statistical inference, scientific integrity and ethics relating to the use of experimental subjects and is based upon Holmes et al. (2006). In 2007/08, when the described project took place, the class was held during the first 5 weeks of the Fall semester and had an enrollment of 129 students. The course consists of twelve fifty-minute lectures supported by five, two-hour practicals (labs) over the course of 5 weeks making it a rather intense experience for both students and lecturer. Ten of the lectures and four of the practicals cover the immediate statistical topics while the remaining contact time is devoted to ethics. The ten lectures on statistics are the focus in this report.

The lectures in this course were held in a large lecture theater with the majority of the time spend on traditional lecturing and going through examples. The practicals on the other hand were held in two groups of 50 and 79 students. During the practicals students were given 3 or 4 exercises to complete that covered the topics of the previous two lectures. All computations had to be done using calculators as no computers were available due to the size of each group. The lecturer and four postgraduate students were present to answer any questions students had with the exercises. The setting in the practicals was very informal so that students could work in groups if they wished. Before the students left, two, randomly choosen, problems had to be handed in.

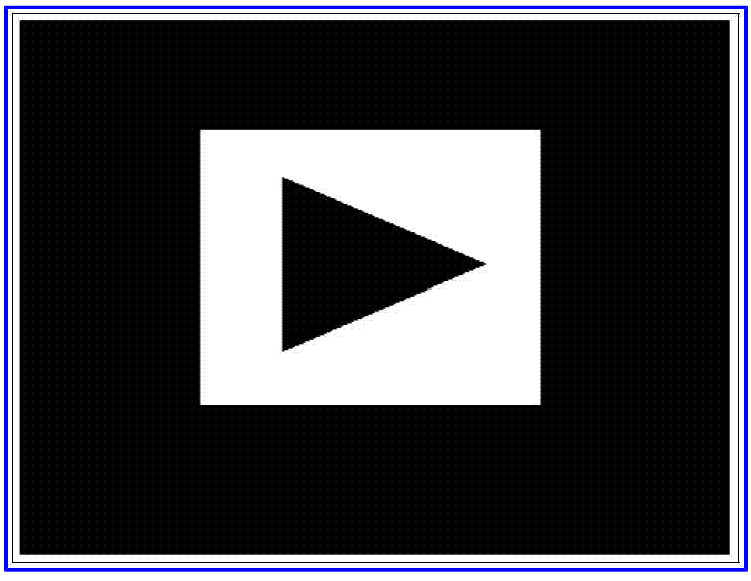
The assessment for the course consisted of the collected problems done during the practical sessions (25%) and an in class exam during the last day of lectures (25%). As the course was held at a British University, the remaining half of the grade was determined though a summer examination. In the British system, a comprehensive exam is given at the end of the year for every course which are usually called the summer exams or end of year exams. Students therefore have to take between five and ten such exams within a few weeks each year. Students who fail to achieve the necessary grades for their courses will be offered the opportunity of taking resit examinations in the relevant subject(s). The resit examinations normally take place in the first week of September. The summer examination for this course was held in the beginning of June and therefore over six months after the last lecture.

3. Lecture recording

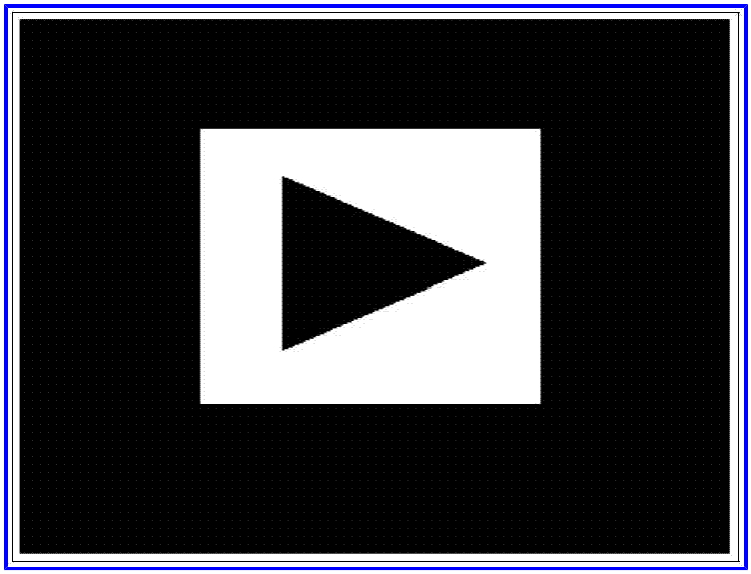
To prevent students that are unable to keep up with the pace set in the lectures from falling behind and to allow for more efficient reviewing before the summer examination, the opportunity to revisit the lectures was offered to the students. Every lecture was recorded and made available for download on the virtual learning environment (LUVLE) for the course. The main challenge associated with the recording was to make it effortless while giving a full account of the material covered. The immediate option to set up a video camera to record the lectures was therefore quickly discarded as too complicated and time consuming. The main reason for this was that video cameras are not standard equipment in lecture rooms and as there are only ten minutes available between lectures it was thought to be infeasible to bring a camera and set it up in time. Additionally extra time would have been required to bring such recordings into a shareable format to be used by the students. As the alternative we choose to use screen capture and in particular the free software CamStudio (http://camstudio.org/) instead. The program produces a video file of the screen output synchronized with the lecturer's voice. Since the plan was to use slides in the lectures, recording the computer screen together with audio gave a comprehensive account of the lectures.

The use of CamStudio proved indeed to be effortless as it required only a microphone attached to the computer and starting the software at the beginning of the lecture. The resulting avi-file of a fifty minute lecture had a size of about 40 MB and was made available for download immediately following the lecture. While it is certainly possible to edit the video we chose not to do so in order to give a more realistic account of the lecture which included the interaction with students and to reduce the time commitment necessary to make the lectures available.

One of the initial drawbacks of using screen capture instead of a video camera was that examples done on the board were not recorded. This problem, however, was quickly overcome by the use of a tablet laptop which allowed writing out examples during the lecture on the computer screen and projecting them to the students at the same time. As the examples were now visible on the computer screen as well, screen capture also recorded them. As a positive side effect, there were no longer any potential problems with visibility of the examples written on the board as they were projected onto the large screen a well. Movies 1 and 2 show two short examples of recordings during the lecture.



Movie 1: This recording was taken during a lecture on hypothesis testing.
A Java applet was used to motivate the idea of hypothesis testing. Note: Requires video codec WMV3.



Movie 2: This recording was taken during a lecture on regression.
It shows the computation of the correlation coefficient. Note: Requires video codec WMV3.

4. Results

During discussions with colleagues about recording lectures and making them available to the students one immediate concern was attendance. Being at the lectures is strongly encouraged but not required at Lancaster University. The attendance numbers are, however, routinely checked through non-consequential sign-in sheets. With the lectures available online the incentive to attend the lectures was thought to be small. From Figure 1, however, it can be seen that the lectures generally had high attendance that did not diminish with time suggesting that the recorded lectures did not in uence the attendance negatively. This finding is further strengthened when comparing these percentages to the practical session where attendance was mandatory which showed appearance rates of about 90% as well.

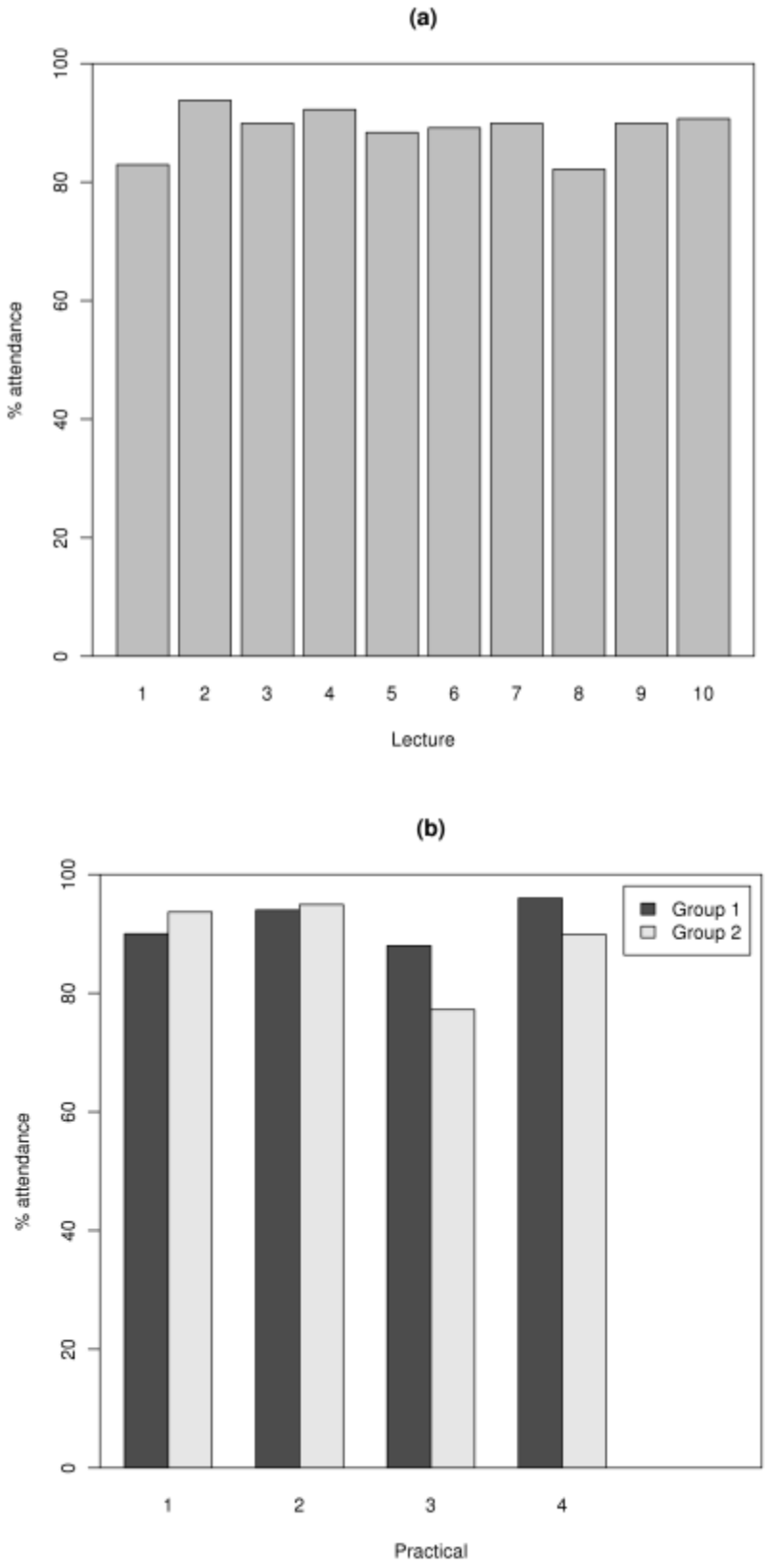


Figure 1. Attendance in percent. (a) for lectures, (b) for practicals.

One of the immediate results of providing the students with access to recorded lectures was that a handful of students proposed that in the future all required lectures for biology majors should be recorded. The department of Biological Sciences, however, discarded the idea of recording these lectures as well as they thought that

students would start demanding these recordings for all courses. In the department of Mathematics and Statistics on the other hand several lecturers planned to, and some in the meantime have, record their lectures as well.

To investigate more thoroughly if students used the recorded lectures, an anonymous feedback questionnaire was given during the last lecture (see Appendix A). Of the 117 students present, 101 completed the feedback form. Overall the feedback on the course was positive with only a few negative comments and suggestions for improvement.

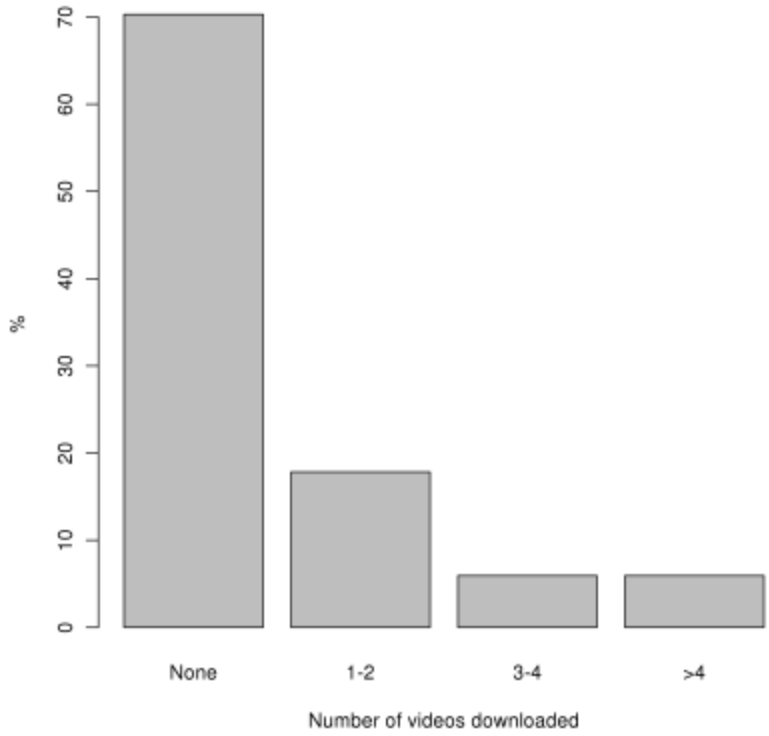


Figure 2.
Results for 'How many videos of the lecture did you download?' before the end of lectures examination.

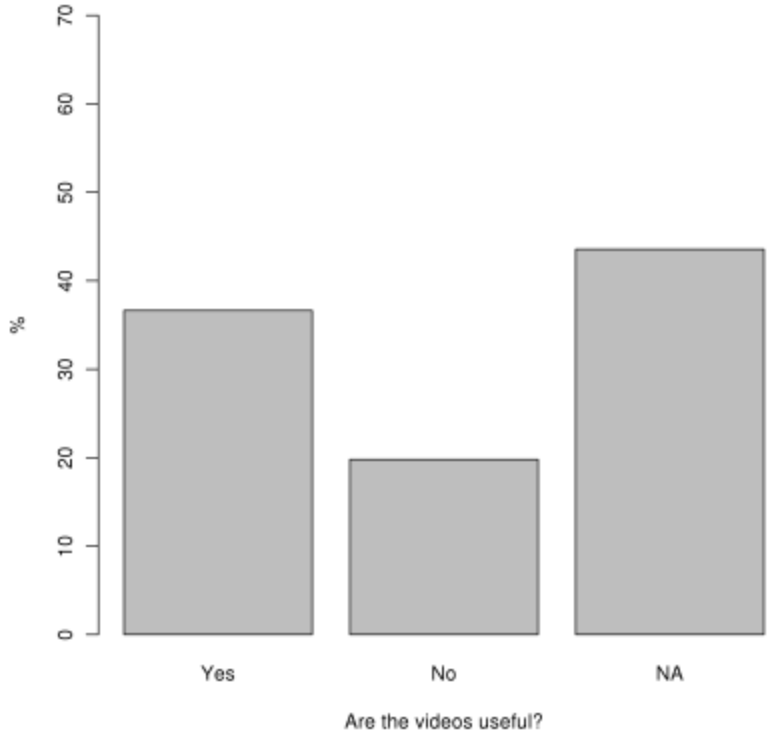


Figure 3. Results for 'Did you find the videos of the lectures useful?' before the end of lectures examination.

30% of the students reported that they have downloaded at least one of the videos (Figure 2), all of which found the recorded lectures useful. Interestingly an additional seven students thought that the videos were useful (Figure 3) even without downloading any at this point. This suggests that these students think that having access to the lectures is useful, but that they have not yet needed them. A few interesting points could also be deduced from the open answer questions. A total of ten students mentioned that they tried to watch the videos, but for technical reasons could not. To avoid this problem in the future one could either use a file format and codec that is standard in many installations to record the videos or provide the videos in more than one format.

An even more interesting finding was that 17% of the students that had not downloaded a video yet, mentioned that they planned on using the recordings at a later date for reviewing purposes. This percentage is surprisingly high, as students were not explicitly asked if they will use the recordings at a later date but volunteered this information in the open answers suggesting that the true percentage of students that planned to use the recordings later was in fact much higher. By combining these factors we find that at least half of the students are potentially interested in using recorded lectures as a learning aid.

To verify the claim that more students would watch the videos for reviewing purposes before the summer examination as well as to investigate the reasons for making use of the recordings a second feedback form (Appendix B) was given to the students. The feedback was collected via email after the summer examination took place which consequently lead to only 29 responses after multiple attempts for a response rate of 22%. The percent of students that reported to have watched at least one of the videos indeed did increase to about 60%. Although care needs to be taken when interpreting this percentage due to the small response rate it may suggest that many students have used the videos for reviewing purposes while they did not find it necessary to use them as preparation for the exam at the end of lectures. In addition every student that watched the movies found them to be useful.

An interesting behavior can be seen when looking at the portion of students that did and did not watch lecture

videos separately for students with advanced mathematics courses (A-level) in highschool (Table 1). While half of the students without A-levels did watch the lecture videos the figure rises to 80% for students with A-levels. Although this is not statistically signficant (p-value: 0.2341 using Fisher's exact test), likely due to the small sample size, this could suggest that students with a keen interest in the subject tend to use additional support offered. Further study will be necessary to investigate this hypothesis more thoroughly. No gender difference (p-value: 0.4495) or impact of the satisfaction with the grade before the summer exam (p-value: 0.6693) on the use of the recordings was found.

		A-level in mathematics		
		Yes	No	Total
Watched videos	Yes	7	10	17
	No	2	10	12
	Total	9	20	

Table 1: Number of students that watched recordings by A-level.

When considering the number of videos watched (Figure 4) it was found that it varied greatly although the reasons for watching them where largely the same. The majority of students only watched videos to lectures that they found particularly difficult; none of the students did watch all the lecture videos and only two students said they watched lectures they had missed. Those two students were also the only ones that always watched the entire video, rather than picking out portions that were percieved as difficult, while the majority of the students watches parts of the lectures on some occasions (Figure 5).

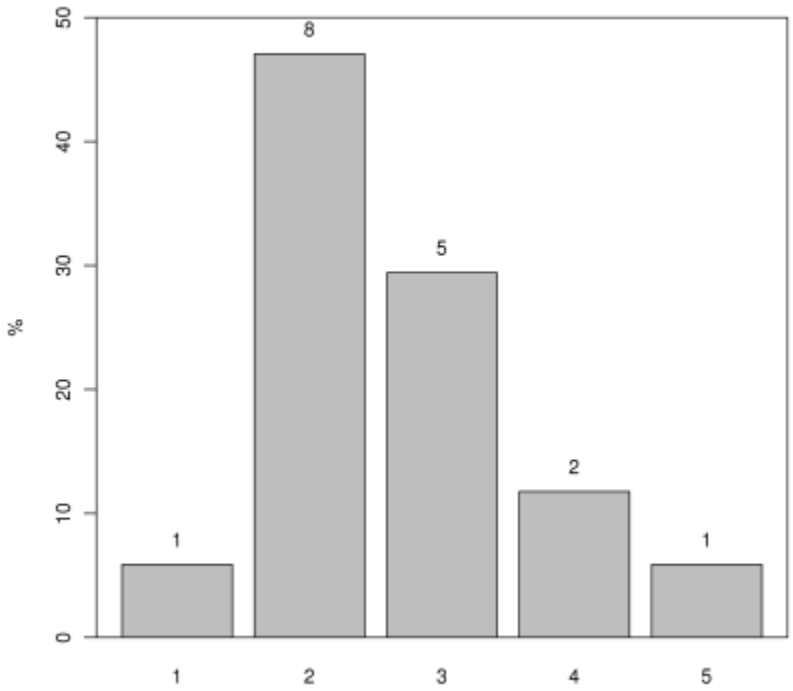


Figure 4: Number of videos watched by students that did watch at least one.

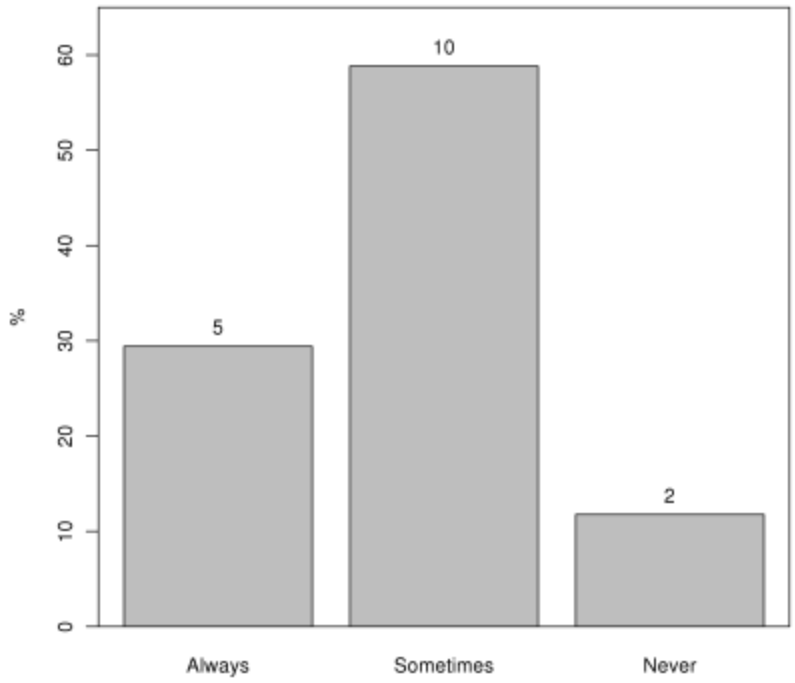


Figure 5: Did you watch only parts of a lecture?

A couple of comments provided on the second feedback form deserve to be mentioned as well. The main reason given for using the videos was for reviewing purposes while technical problems or lack of motivation were the dominating factors for not using the recordings. Five students claimed that they did not use the recordings as they understood the material well enough without them but three of them indicated that they might use recordings in other lectures or subjects. Furthermore, two students mentioned that they would never use the videos of the lectures as they are to boring to watch as only the slides are visible.

5. Conclusion and discussion

This note describes our experiences with providing students in a service course with the recordings of the lectures as an additional learning aid as many students struggle because of the large volume and high pace in such courses. This problem later is further enhanced for the summer examination, which in the described case, took place more than six months after the last lecture, when the memory of the lectures has faded, leaving even more students struggling. To allow students to revisit the lectures, the projected computer screen was recorded in combination with the voice using the free software CamStudio and made available to the students immediately after the lecture. This approach is used in addition to a traditional lecture format and not to replace any part of it and consequently can only benefit students as long as they still attend the traditional lectures.

Although a few minor adjustments to a traditional lecture, such as writing on the computer screen instead of the board, have to me made to obtain a full account of the lecture, the recording proved to be easy and the experiences have been overwhelmingly positive. The fear of diminishing attendance when providing a recorded account of the material did not appear to be justified and over half of the students used the recordings of the lectures. The dominant reasons to watch the videos were to revisit particularly difficult parts of the lectures and for reviewing before the end of year exams.

Although it seems that the majority of students did not have any problems with the videos, there are still some that reported problems with playing the video format. It therefore would have been beneficial to provide the recordings in more than one file format. Furthermore, two students reported that they could not download the files due to their size. As a possible solution CDs with the videos could be provided to those students after the last lecture to allow them to use the recordings while reviewing for the summer exam.

The above findings are very much in line with the experiences of another lecturer in the department of Mathematics and Statistics who used CamStudio to record his lectures in a course on Bayesian statistics to a composite class of about 50 third year and masters students in statistics. In addition to recording the live lectures, he also pre-recorded the lectures in order to see his lectures from a students perspective beforehand and to obtain feedback on his own use of technical language. During this initial recordings he experienced some problems playing the recordings as the default codec used by CamStudio was not installed on his computer. Once this problem was sorted, however, the recording of the lectures turned out to be easy and straightforward.

Although no formal evaluation on the use of the recordings by the students was done, several students reported in personal discussions with him that they did watch the recordings and found them useful. In particular the opportunity to revisit difficult parts of the lecture and the chance to prepare for the end-of-year exam were mentioned here as well.

Appendix A - Feedback questionnaire 1

Feedback

Please circle your answers!

1. How often did you visit LUVLE for this course?

never a few times weekly more often

2. How many videos of the lecture did you download?

none one or two three or four more than four

3. Did you find the videos of the lecture useful?

Yes No N/A

Open answers (continue on back if necessary)

4. What did you like about this course?

5. What did you dislike about this course?

6. Do you have suggestions how to improve this course?

Appendix B - Feedback questionnaire 2

BIOL121 Videotaping lectures

Feedback Form

Directions: Please answer the following questions as honestly as possible. Your answers will provide useful information about the best use of videotaping lectures in the future.

Please read each question carefully and circle your answer where appropriate.

1. Did you watch any videos of the lectures?

Yes No

What was the main reason that you did/did not watch videos of the lectures?

If you answered No, please continue with question 7.

2. Did you find the videos useful?

Yes No

3. How many videos did you watch? _____

4. Which lectures did you watch?

All Lectures I missed Lectures I found difficult

5. Did you watch only parts of a lecture?

Always Sometimes Never

6. Did you have technical difficulties?

None Sound Picture Download

7. Do you have Mathematics A-levels?

Yes No

8. Are you satisfied with your mark for this module prior to the end of year test?

Yes No

9. Your gender:

Female Male

Thank you for your feedback. Please send me your responses via email to jaki.thomas@gmail.com.

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