# Does Replacing Face-to-face Lectures with Pre-recorded Video Lectures Affect Learning Outcomes?

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Abstract: Videoing lectures have been popular during the past decade. The literature on the effect of video lectures is controversial. Some studies indicate that video lectures have a positive effect on learning outcomes and student satisfaction, while some state that there is no effect at all. In this paper, we share the results of a university undergraduate course, where half of the lectures were replaced by pre-recorded lectures. The results indicate that using pre-recorded lectures had a statistically significant positive effect on grades. Also, the students' satisfaction levels were higher.

## 1 INTRODUCTION

Videoing lectures in the universities has gained popularity during the past decade. Some earlier studies indicate that videoed lectures may improve students' grades and course satisfaction, but some indicate that there is no significant difference (Bennett and Maniar, 2007). As such, the literature is controversial. Value to students also depends on how the videos are used (Williams *et al.*, 2012); If videos are complementary, they are valuable, if they are used to substitute the lectures, they are not.

It seems to be unquestionable that students do like video lectures (Secker *et al.*, 2010; Settle *et al.*, 2011). One reason for this is that students may revisit the videos as many time as needed (Bennett and Maniar, 2007). Teachers, however, do not like videos (Secker *et al.*, 2010). There are two main reasons for this: (i) perception that videoed lectures reduce attendance, and (ii) not all lecture styles are suitable for videos (ibid.).

In this paper, experiences and insights from an undergraduate course, where half of the lectures were replaced with pre-recorded video lectures, are shared.

## 2 COURSE ARRANGEMENTS

The University of Jyväskylä in Finland has one of the biggest faculty of Information Systems (IS) in Europe. There are programs for both undergraduates and graduates. There are some mandatory courses for all undergraduate students. These courses have typically around 200 students and therefore called a mass-courses. One of these courses is Information Management Basics, TJTA114.

The course consists of nine lectures, each focusing to a certain theme. To pass the course, students need to pass an exam and do an assignment in groups of five. The grading scale is from 0 (failed) to 5 (excellent).

In 2017, when the course was first to run, all the lectures were recorded and made available to students. Basically, this allowed students to attend the course without a need to sit personally in lectures. The recording had both slides and the live footage of the lecture (see Figure 2). The length of each lecture was from 70 to 90 minutes.

In 2018, the first four lectures were pre-recorded in front of a green-screen. This allowed the use of a "talking head" (see Figure 1). The lecturer could also edit the recording, which allowed the lecturer to repeat if something was said wrong. The rest of the lectures was recorded the same way than in 2017. The study material and lectures were identical on both courses, including the lecture lenghts. Also, the group assignment was the same.
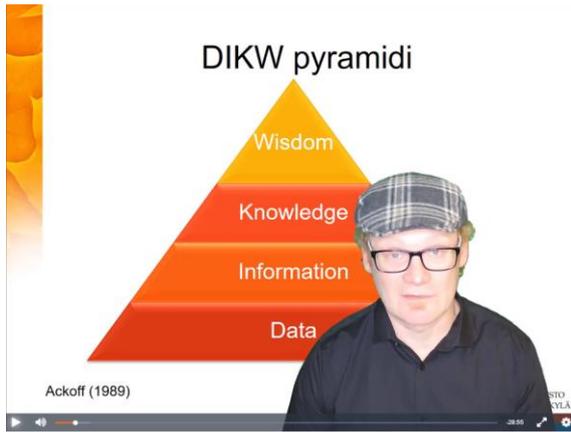
Figure 1: Pre-recorded Lecture.

# 3 RESEARCH METHOD

Two data sources were used in this paper: the course grades and a course feedback questionnaire data. The questionnaire had questions related to *teaching and working methods* and *learning results*. The questions were presented as claims, such as "Now I understand better the subjects of the course". The used scale was a Likert scale from 1 (totally disagree) to 5 (totally agree). Throughout the course, students were encouraged to give feedback, especially for pre-recorded lectures.

# 4 RESULTS

In 2017 there were 240 students attending the course, and in 2018 197 students (see Table 1). Roughly 12 per cent of students replied to the feedback questionnaire in both years. The drop-out rate was a bit higher in 2018 (22 per cent) than 2017 (18 per cent). The average for similar courses is 20 per cent.

Table 1: Course statistics.

|  | 2017 | 2018 |
|---|---|---|
| Enrolled | 240 | 197 |
| Drop-out rate | 0.175 | 0.223 |
| Questionnaire reply rate | 0.121 | 0.118 |

The live-lecture attendance was not recorded, but according to the lecturer, the number of students was remarkable lower during 2018 (~20) than in 2017 (~40). During both years, attendance also dropped after the first live lecture.

## 4.1 Grades

The statistics of the grades are presented in Table 2. As can be seen, 198 students completed the course in 2017, and 153 in 2018.

Table 2: Grade statistics.

| Statistics | 2017 | 2018 |
|---|---|---|
| Observations | 198 | 153 |
| Mean | 3.899 | 4.222 |
| Std. Deviation | 0.893 | 0.794 |
| Variance | 0.802 | 0.635 |

T-Test results for the grades are presented in Table 3. As the t-Test results indicate, there was a small but significant difference in the grades for 2017 (M=3.899, SD=0.8993) and 2018 (M=4.222, SD=0.794); t(342)=3.570, p=0.000. Grades in 2018 were 0.3 higher than in 2017.



Figure 2: Recorded Lecture.

Table 3: Grades t-Test results.

| df | 342 |
|---|---|
| t Stat | 3.570 |
| Sig. (2-tailed) | 0.000 |
| t Critical (2-tailed) | 1.967 |
| Mean difference | 0.323 |

The grades indicate that replacing half of the live lectures with pre-recorded lectures increased the learning outcomes.

## 4.2 Course Feedback

Only summative statistics data, i.e. mean and standard deviation, was available for course feedback. Therefore, it was not possible to use t-Test. Means and standard deviations for the *teaching and working methods* are presented in Table 4 and Table 5, respectively. As can be seen, the feedback average in 2018 is slightly (0.023) higher than feedback in 2017. Also, the standard deviation was slightly lower in 2018 (1.000) than in 2017 (1.043).

Table 4: Teaching and working methods 2017 (*n*=24).

| Question | Mean | Std. dev |
|---|---|---|
| 1. The course had clear learning outcomes | 4.000 | 0.978 |
| 2. Teaching helped me to combine the studied subjects and my previous knowledge and experience | 3.880 | 1.035 |
| 3. The course included studying or concretising information in practical applications | 3.920 | 1.060 |
| 4. Teaching inspired in-depth reflection on study subjects | 3.670 | 1.049 |
| 5. The course had an open, stimulating atmosphere for discussion and questioning | 3.920 | 1.139 |
| 6. The course supported my learning well | 3.960 | 0.999 |
| Average | 3.892 | 1.043 |

Means and standard deviations for the *learning results* are presented in Table 6 and Table 7. The feedback average in 2018 is slightly (0.332) higher than in 2017. The standard deviation was practically the same in both years.

The course feedback indicates that using pre-recorded lectures has a positive effect on both perceived *teaching and working methods* and perceived *learning results*. The most interesting is the question number 9 from the learning results: "I achieved the learning objectives of the course". In 2017, the mean was 3.870 with a standard deviation of 0.947. In 2018, the mean was 4.235 with a deviation of 0.730. Thus, the increase was 0.365 with lower standard deviation.

Table 5: Teaching and working methods 2018 (*n*=18).

| Question | Mean | Std. dev |
|---|---|---|
| 1. The course had clear learning outcomes | 4.170 | 0.833 |
| 2. Teaching helped me to combine the studied subjects and my previous knowledge and experience | 3.830 | 1.014 |
| 3. The course included studying or concretising information in practical applications | 4.060 | 0.911 |
| 4. Teaching inspired in-depth reflection on study subjects | 3.780 | 1.083 |
| 5. The course had an open, stimulating atmosphere for discussion and questioning | 3.760 | 1.165 |
| 6. The course supported my learning well | 3.890 | 0.994 |
| Average | 3.915 | 1.000 |

Table 6: Learning results 2017 (*n*=21).

| Question | Mean | Std. dev |
|---|---|---|
| 1. Now I understand better the subjects of the course | 4.174 | 0.962 |
| 2. I can apply in practice the things I have learned in the course | 3.391 | 0.920 |
| 3. I can develop new ideas on the basis of what I learned on the course | 3.417 | 0.909 |
| 4. I was able to create a good overall picture of the course contents | 3.708 | 1.098 |
| 5. My thinking develop during the course | 3.522 | 1.175 |
| 6. My ability to study things critically evolved | 3.304 | 0.997 |
| 7. My problem-solving skills developed | 3.045 | 0.878 |
| 8. My interpersonal skills developed | 2.952 | 0.898 |
| 9. I achieved the learning objectives of the course | 3.870 | 0.947 |
| Average | 3.487 | 0.976 |

Table 7: Learning results 2018 (*n*=15).

| Question | Mean | Std. dev |
|---|---|---|
| 1. Now I understand better the subjects of the course | 4.188 | 1.014 |
| 2. I can apply in practice the things I have learned in the course | 3.625 | 0.927 |
| 3. I can develop new ideas on the basis of what I learned on the course | 3.769 | 0.890 |
| 4. I was able to create a good overall picture of the course contents | 4.000 | 0.791 |
| 5. My thinking develop during the course | 3.733 | 1.123 |
| 6. My ability to study things critically evolved | 3.462 | 1.151 |
| 7. My problem-solving skills developed | 3.571 | 1.116 |
| 8. My interpersonal skills developed | 3.786 | 1.013 |
| 9. I achieved the learning objectives of the course | 4.235 | 0.730 |
| Average | 3.819 | 0.973 |

# 5 CONCLUSION

The current literature was controversial whether videoed lectures had an effect on learning outcomes and student satisfaction. We used two instances of the same TJTA114 course to see whether replacing half of the lectures with pre-recorded has any effect. As the results clearly indicate, using pre-recorded lectures had a small, but significant, effect on grades. Also, student satisfaction was slightly higher.

## 5.1 Limitations

Data for this research was collected from two sources: grades and course feedback. For course feedback, we only had access to summative data. Thus, a t-Test could not be used to see how significant the difference between the two courses was. Also, the number of responses was too low to draw strong statistical conclusions.

In 2018, only half of the courses were pre-recorded. Thus, we cannot claim that pre-recorded lectures are categorically better than recorded live lectures.

## 5.2 Contributions to Practice

The results revealed that using pre-recorded lectures does not have any negative effect on grades and students' feedback. This encourages teachers to use pre-recorded lectures as one teaching tool among others.

## 5.3 Contributions to Science

The study confirms findings of previous studies which found that videoed lectures have a positive effect on learning outcomes. The study also shows that using video lectures to substitute live lectures has value to students. Thus, the results contradict findings of Williams *et al.* (2012).

## 5.4 Directions for Future Research

The study pointed out some directions for future research. First, the statistical evidence of the feedback data could be strengthened by gaining access to the original questionnaire data. Second, to provide more support for our findings, the whole course should be carried out using pre-recorded lectures only.

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