ON THE RECORD: STUDENT MOTIVATIONS FOR RECORDING LECTURES AND IMPLICATIONS FOR LEARNING

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Abstract

Prior to the pandemic, a second-year engineering course was delivered using a blended synchronous format. Students were surveyed on many aspects of their experience with this format including their use of recorded lectures.

Participants reported both recording and watching behaviour: 30% of students watched recorded lectures with students watching or recording at least half of the lectures throughout the semester. From the results, recording of the lectures offers an increase in the final grade of, on average, 9.5% ($p=0.0071$) for both low attending and high attending students. While attending most synchronous lectures tends to yield overall better performance (on average, 14.4%, $p=0.0001$), low attending students can overcome part of that gap by reviewing recorded lectures.

Motivations for recording were associated with scheduling conflicts that prevented participants from attending the live lecture and participants wanting to review the material afterwards. Generally, students chose not to record the lectures because of a perceived barrier to doing so or a perception that their existing lecture notes were sufficient.

Post pandemic, it may be beneficial to incorporate lecture recording with face-to-face lectures to allow students the additional benefit of reviewing lecture material and increasing student access to lecture content.

Keywords: Grades, Recorded lectures, Blended synchronous learning, Attendance, Student learning

1. INTRODUCTION

The move to online learning due to COVID-19 has universally changed the delivery of courses in higher education. With the change in delivery methods, and the availability of technology to do so, there is an opportunity to adapt traditional teaching and learning methods with best practices taken from this year's experiences. One of these opportunities is the recording of synchronous lectures.

Prior to the pandemic, a second-year engineering course at the author's institution was delivered using a blended synchronous format, allowing students to synchronously

attend lectures in person or remotely. Students in two offerings (taught by the same instructor) were surveyed on many aspects of their experience and their responses were linked to their final grades [1].

Results in [1] indicate that students attending more than 75% of synchronous lectures (whether they attended face-to-face or remotely) performed on average 12% better than other students ($p=0.001$). Furthermore, students perceived the ability to ask questions as a main driver for attending lectures. Some natural questions arose: If attending synchronous lectures has a strong impact on grades, does it matter if students record the lectures and watch them later instead of attending live? What are some factors that motivate students to record lectures and potentially review them? The first question has been studied in other papers [2-6]. This paper briefly addresses the first question before focusing on the second question, specifically in the context of a blended synchronous learning course offering.

1.1. Outline

This paper is organized as follows: we begin with methods and materials, where we outline relevant aspects of the course, the participant pool, the instruments, and the statistical tools. We then present our statistical analysis of correlations between Grades and GPA, attendance, and recording behaviour and our qualitative analysis of open-ended survey responses. We conclude with a discussion of the results and relevant conclusions.

2. METHODS AND MATERIALS

2.1. The course

The course is a second-year electric circuits course core to all engineering students in the authors' institution. The course has three hours of lectures/week and two hours/week of time that alternated between problem solving tutorials and hands-on lab time. Tutorials and labs were delivered by teaching assistants and lectures were delivered by a faculty member using a blended synchronous delivery method. The course instructor is one of the authors.

The instructor delivered the lectures by scribing handwritten notes on a Microsoft Surface which were projected onto large screens at the front of the class. In addition to the live handwritten notes, all students had access to a set of incomplete textbook-style course notes

that contained strategic blank spaces for students to fill in during lectures.

Many students who wanted to access the summer offerings were living away from the university that term. To address the needs of these students, the summer offerings added the use of Adobe Connect version 9 (Adobe Systems, San Francisco, California) to live-stream the lectures, including both the instructor's voice and the instructor's hand-written notes (scribed using Microsoft Journal (Microsoft, Redmond, Washington)) on a Surface Pro 2 (Microsoft, Redmond, Washington). Video was not included in the feed.

In the first offering, students were instructed to seek permission to record the lectures. After the first survey, several students (n=14) had suggested recording lectures would be valuable. Based on that information, students were given permission to record the lectures in the second offering of the course. In both offerings, the instructor did not provide recordings of the lectures¹: students had to find their own means of recording the lectures.

To allow students connecting remotely to engage in the lecture, the 'Chat Pod' feature in Adobe Connect was enabled, allowing remote users to participate synchronously in the lectures by typing text in an online chat box. Students (both remote and face-to-face) could type questions or comments, and the instructor would then acknowledge and verbally respond. In the classroom, the chat and handwritten notes were simultaneously projected onto the screen at the front of the classroom so that participants physically present in the room could see the chat content without being logged in.

The assessment breakdown of the course was (nominally)

- Lab (group): 15%
- Midterm (individual): 30%
- Final (individual): 55%

In all cases, students were required to pass the combination of the midterm and final to pass the course.

2.2. Participants

The participant pool was all registered students for the S1 (n=74) and S2 (n=47) offerings. From those pools, 42 students in S1 and 15 students in S2 provided consent to participate in this study. Participants were removed from the study for one of two reasons: 1) participants did not fully complete the survey and 2) participants did not write one of the two exams.

The overall course averages were 61.5% (S1) and 57.9% (S2), while the overall course average of participants was 63.6% (S1) and 63.7% (S2).

¹ The instructor did not provide lecture recordings because accessing and disseminating these recordings was arduous given the institution's available software and

Participants were recruited via an in-class announcement and an email inviting them to participate in the study. The email and associated on-line survey were sent to students in the last two weeks of class. Informed consent was administered via the first question in the on-line survey.

2.3. Survey

Participants were asked to complete a Research Ethics Board (REB) approved survey (REB approval #14JN034). This survey was initially created by the researchers as a quality assurance tool to assess the novel delivery of this first ever summer course offering. As such, many of these questions were asked as part of the program and instructor's continual improvement efforts and are not relevant to this study; relevant questions are included in the appendix.

The online survey used a combination of Likert-style questions, open-ended response boxes, and specific numeric questions. The survey assessed multiple aspects of the course delivery and student experience including:

- Attendance and workload (22 questions)
- Employment and commuting (15 questions)
- Course delivery and engagement (23 questions)
- Demographics (7 questions related to GPA, failed courses, program of study, etc.)

The survey was re-administered the following year. In all cases, student responses were tied to their final course grade.

A potential limitation of this study is the reliance on self-reported student data; however, as long as survey questions are clear, refer to recent activities, the respondents think the questions are important, and answering the questions does not violate the privacy of the respondent, then the results are likely valid [7,8]. All of these conditions are true in our study; therefore, our self-reported data (including GPA and attendance) are likely valid.

2.4. Quantitative Analysis

Multiple Linear Regressions (MLR) were performed ($p \leq 0.05$) on the dependent variable Grade (%). The independent variables were all self-reported and included:

- GPA
- Percentage attendance
- Whether or not the participant recorded and watched lecture recordings

Data for the independent variables were obtained from the completed questionnaires. All statistical analyses were performed using R, version 3.5.1.

technology at the time (prior to the pandemic). With the current availability of software and technology, this is no longer a barrier.

2.5. Qualitative Analysis

To review student perceptions and motivations, qualitative data were collected from the open-ended survey questions relating to the student experience with recording lectures. These responses were reviewed by the authors to identify a list of significant statements that were later binned into common themes. Generally, there was good agreement regarding the identification of themes between the authors – any discrepancies were discussed to reach a consensus.

3. RESULTS

Participants reported both recording and watching behaviour: 30% of students watched recorded lectures ($n = 6$ from S1 and $n = 11$ from S2) with $n=10$ of those students watching or recording at least half of the lectures throughout the semester. When a recorded lecture was watched, it was watched either once ($n = 12$) or twice ($n = 4$).

In the remainder of this section, we present quantitative and qualitative results that reveal the impact of recording on grades and student motivations for recording and watching.

3.1. Impact of recording on overall course grade

Previous research shows that both GPA and attendance are known predictors of grade outcomes [9, 10]; in previous research using this dataset [1, 11], we analyzed the effect of attendance and GPA on student performance. Following the same process, here we collected participants' self reported attendance into two bins: those who attended <75% in one category (Attend=0, $n=17$) and those who attended >75% bin into another (Attend=1, $n=40$).

New in this paper is the inclusion of self-reported recording behaviour, which we capture via two additional bins: those who did record and/or watch (Record=0, $n=17$) and those who did not record and did not watch (Record=1, $n=40$).

A parallel model linear regression was performed correlating Grades to self-reported GPA, Attendance, and Recordings, yielding:

$$\text{Grades} = 10.47 + 0.74 * \text{GPA} + 14.40 * \text{Attend} - 9.52 * \text{Record},$$

with $R^2=0.377$ (see Table 1 and Figure 1)². Our previously reported R^2 for GPA vs attendance *without* considering the effect of recording is 0.285 [1]. Including the effect of recording provides an increase of 0.092, roughly a quarter of the total R^2 .

² The interaction terms between Attend, Record, and GPA yielded negligible improvement in the model and were not significant, and hence were not included.

Table 1: Coefficient table of GPA vs attendance and recording, parallel model

	Estimate	Std. Error	p
Intercept	10.47	23.16	0.653
GPA	0.74	0.346	0.0362
Attend	14.40	3.491	0.0001
Record	-9.52	3.401	0.0071

Figure 1: Grades vs GPA, attendance, and recording

From Figure 1, it is evident that attending more than 75% of lectures is positively correlated with final grades and the final course grade is positively correlated with student GPA. Crucially, the recording of the lectures is associated with an increase in final grades, irrespective of attendance behaviour.

3.2. Student motivations

A qualitative analysis of the student responses to the open-ended survey questions elicits a better understanding of the influence of recording lectures on the final course grades and student motivation for recording or watching the recordings.

3.2.1. Motivations for recording

Here, we explore motivations for *recording* or *not recording* lectures. In both cases, two main themes emerged. Motivations for *recording* were a *scheduling conflict* that prevented participants from attending the synchronous lecture (n=7) and participants wanting to *review the material afterwards* (n=6). More students chose not to record; here, motivations were a *perceived barrier* (n=24) or a perception that the participant's existing lecture notes were *sufficient* (n=7).

Digging deeper into the theme of *perceived barriers*, we found four sub-themes. Some participants (n=6) from the S1 offering reported that they believed they were *not allowed* to record the lectures. More students reported technology barriers: either that they *didn't know how* to record (n=3) or that they *didn't have the right software* (n=7). Finally, some participants reported that they were not able to record due to *work restrictions* (n=8) as they were remotely attending the lecture.

3.2.2. Motivations for watching recordings

Comparable themes emerged when students were asked why they watched or did not watch the recorded lectures. For those that watched the lectures, students wanted to *review the concepts* (n=7) to clear up any misunderstandings or to *catch-up* (n=3) on missed lecture material:

"Excellent to go back and get [Instructor's] main points from each lecture and to hear the examples of situations again."

Similar to the *notes were sufficient* theme that emerged with respect to choosing not to record, participants reported that they did not watch the recorded lectures because they felt they *already understood the material*:

"I generally felt after class I understood the content enough that if I got stuck studying I could refer to my notes."

3.2.3. Motivations for recording and attending synchronous lectures

The survey asked, "If you attended lectures live *and* recorded lectures, why did you do so?" Of the n=10 respondents who reported recording and attending live, n=7 said the main motivation for attending live lectures was to have the opportunity to ask questions to address any misconceptions. The motivation to both attend live *and* to record lectures is best summarized by this student:

"To learn from them [lectures] - not only have the real time interaction but also the possibility of asking questions or

clarifications. The recorded lectures were a nice plan b, but attending lectures in person was plan a."

4. DISCUSSION

Our results clearly show that attendance is the single strongest predictor of grades, followed by recording behaviour, and *then* GPA. This is consistent with Schnee et al. [4], whereby students using recorded lectures as a supplement to attending lectures face-to-face performed better on an exam in a first-year university pharmacology class compared with students using recorded lectures and not attending lectures.

Generally, students perform better when attending a minimum number of lectures [10, 12, 13]. Based on the literature, and previous findings [1,9,10], the difference between the performance of the high attending students and low attending students is unsurprising. Interestingly, recording of the lectures offers an increase in the final grade of, on average, 9.5% for both the low attending and high attending groups. While attending the majority of synchronous lectures tends to yield overall better performance (on average, 14.4%), low attending students can overcome part of that gap by reviewing recorded lectures. This is consistent with other studies [5, 6] and suggests that having better access to the lecture material can improve learning and overall student performance.

Similarly, students will use the recorded lectures as a supplementary resource to address any misconceptions they have about the lecture material. This additional resource enhances the student learning experience which translates into better performance. Students are better able to focus on the lecture material with reassurances that they can review the recorded lecture material afterwards if there are any lingering uncertainties [14].

Concerns over reduced lecture attendance due to the availability of recorded lectures can be allayed by the nature of the lecture experience. Students will attend class if they feel there is value in attending [15]. If the lecture experience is no more interactive than the recorded lecture, student attendance will decline [6]. By increasing the active learning components and the interactivity of the lecture, students will be more motivated to attend class.

Given the benefit of having recorded lectures as a resource, in the post-pandemic university institutions should invest in the technology to allow for lecture capture during a synchronous, face-to-face lecture. Providing recorded lectures will eliminate the main barriers students have in trying to access the course material. Indeed, these recorded lectures can help those students who synchronously attend to address any misconceptions they may have, while offering an opportunity for those students unable to attend to review the material.

Recording synchronous lectures will be particularly important for first-year students entering post-secondary

education immediately post-pandemic, since they have become accustomed to online learning and the availability of recorded lectures. Transitioning to synchronous face-to-face lectures without the reassurance of having recorded lectures may prove to be difficult for those students and is worth further investigation. Instructors should be aware of this situation so they can help these students transition to face-to-face lectures. Being able to watch recorded lectures may help with that transition.

5. CONCLUSION

Students perform better when they have access to recorded lectures whether they attend the lectures or not. Students attending synchronous lectures use the recorded lectures as a supplementary resource to address any misconceptions they may have. Students unable to attend the lecture also see improved performance as they have better access to the course material. Students choose to record lectures so that they can review the material after the lecture, or they anticipate a scheduling conflict with the synchronous lecture. Students generally do not record lectures because of some barrier preventing them from doing so, or they feel that they understand the material sufficiently. Post-pandemic, it will be beneficial to equip classrooms with lecture capturing technology to allow for better accessibility to the lecture material and to offer greater learning opportunities.

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**APPENDIX A: RELEVANT SURVEY
QUESTIONS**

Did you record the lectures or watch recorded lectures that someone else recorded? Yes/No
Why?

Of the lectures you attended remotely, what percentage did you record? 0-25%, 25-50%, 50-75%, 75-100%

Did you watch these recorded lectures later? Yes/No
Why/why not?

How many lectures? 0-25%, 25-50%, 50-75%, 75-100%

For each lecture, on average, how many times did you watch it? 1, 2, 3, >3

Did you watch the lectures live? Yes/No
Why/why not?