A case study on using instructor-recorded videos in an upper level economics course

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ABSTRACT

We adopted a version of the flipped classroom concept, defined as delivering some course material via short video lectures to be watched in advance of attending class, for an upper-level undergraduate economics course. Using a survey administered to both flipped and non-flipped sections of the course, we find modest evidence of either short term or long term benefits to students in terms of improving understanding of course material, effective use of time in class, and retention of course material.

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1. Introduction

In recent years, there has been a great deal of interest at both the K-12 and college levels in using various types of media in conjunction with (or sometimes in place of) more traditional teaching methods. One common type of media is the use of audio or video recordings of relevant course material. For example, in the “flipped” classroom, delivery of at least some course material in the form of video or similar audio/visual media in advance of attending class. In the most common form, flipped classes have new material assigned outside class time, with quizzes or assignments given to ensure basic comprehension of key concepts. In-class activities are then designed to make use of the fact that students have already encountered course material.

We recorded a series of videos covering a variety of course material, however we do not “flip” our class in the traditional sense. We discuss our experience in using the instructor-recorded videos, to be watched outside of class time, in support of a senior-level undergraduate course in monetary economics, as well as the results of a survey administered to students in both the video and non-video supported sections of the same course. Our overall experience has been very positive despite the relatively high startup costs. However, based on our survey, while students in the video-supported classroom place value on the videos, there is little statistical evidence that the use of videos may contribute to the learning process.

* We thank Emily Gehley and Gabrielle Williams for assistance with the data. All errors remain our own. We also thank the instructors who graciously allowed us to administer the survey and the students who took the surveys. Finally, we thank Stephen Morris for very helpful discussions regarding the flipped classroom concept and for encouraging us to try it out

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1 Bishop and Verleger's (2013) define the flipped classroom “... as an educational technique that consists of two parts: interactive group learning activities in the classroom, and direct computer-based individual instruction outside the classroom.” We did not require students to watch videos paired up with a graded exercise. We also did not fully do away with in class lectures.

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2. Literature review

The use of media and other alternative pedagogical aids are rooted in the idea that students have a variety of learning styles that may or may not be in tune with the traditional chalk and talk lecture style. In their survey of the literature on flipped classrooms, Bishop and Verleger (2013) discuss a variety of student centered learning styles, including cooperative learning, problem based learning, and active learning. The flipped classroom concept enables these styles because students are somehow made responsible for outside class material and are engaged inside the classroom in something other than a standard lecture. Herreid and Schiller (2013) review the literature on how the flipped classroom affects STEM courses. They conclude that there is a “positive impact” of the podcasts on student attitudes, behavior, and performance. Note that the use of podcasts is somewhat more limited than a true flipped classroom. Day and Foley (2006) taught flipped and non-flipped sections of a computer science course and found that students in the flipped sections performed substantially better on a variety of course assignments. Moravec et al. (2010) flipped a portion of an introductory biology class and reported a material improvement in performance on questions associated with video lecture content. He et al. (2012) report on their efforts to flip an undergraduate chemistry course and find improvement in student performance relative to previous, non-flipped sections of the same course. They also find that students liked the flipped approach.

While much of the literature discusses the use of flipped classroom in STEM courses, Lage et al. (2000) discuss their experience at flipping a principles of microeconomics course. The authors also conducted a survey of their students and found that their overall perceptions were positive toward the flipped classroom experience. There was no control group of non-flipped sections. They point out that their own perceptions of the class were positive as well because students “appeared to be more motivated in the inverted [flipped] classroom.” While this does not directly correlate with improved learning outcomes, a more positive experience on the part of the instructor will, at the very least, motivate the instructor not to abandon the flipped classroom.

Even without flipping the classroom, the use of videos can improve student outcomes. Carlisle (2010) created a series of instructor narrated videos in an introductory JAVA programming course. He found that students surveyed in the course reported that the videos helped them learn and increased enjoyment in the class. He et al. (2012) used video tutorials for specific concepts in an upper level undergraduate chemistry course and found that the tutorials improved performance on exam questions relative to a control group without access to the tutorials and that students reacted very positively to the videos based on a survey.

Much of the empirical evidence is based on simple student surveys and does not employ pre- and post-testing, control groups in non-video supported sections, etc. However, strong evidence is found by the above authors and others that students have a positive attitude toward the use of various types of videos. That aspect alone, even if it is not correlated with improved learning outcomes, is nonetheless valuable and useful.

3. Background, motivation, our experience

Our school, Bentley University, is relatively selective at the undergraduate level: ACT composite scores are 26 and 30 at the 25th and 75th percentiles. The school enrolls approximately 4200 undergraduate students with about a 60–40% male/female split. The vast majority of students major in a business-related field. We teach an upper-level undergraduate class in monetary economics that serves as a capstone course for a combination economics and finance oriented major. All students in the course were seniors in this particular major. The course uses the Mishkin Economics of Money, Banking, and Financial Markets text, along with a variety of supplemental readings. Unlike a standard money and banking course, our course places less emphasis on financial institutions and more on monetary theory and policy. Class size is typically capped at about 25 students.

We were motivated to try out the video-supported concept for a number of reasons. First, our university has smartboard equipped (Centra) classrooms that allow us to record videos of instructors, along with any media (PowerPoint, web pages, etc.) that they wish to use. Many, or even most, of the videos produced in the literature referenced above involve simple voiceover narrations of PowerPoint, or similar type media. Second, we had become frustrated by having to re-teach some basic economic/finance concepts (such as the loanable funds market, for example) before we could move on to more advanced (and interesting) concepts. Attempts to get students to read sections of the textbook or to review online resources proved of relatively little use. Thus, some of our videos cover review material. Third, we wanted to increase in-class activities without sacrificing coverage of relevant material. Therefore, we also recorded videos on topics that are new to students in addition to videos on review material. Fourth, and related to the second and third points, we always felt pressed for time at the end of the semester making sure that we covered relevant course topics. Putting some course content in video allowed us to cover more material and focus on difficult and complex subjects. Finally, off-loading some content allowed for more flexibility in the classroom by creating additional time for interactive activities.

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2 See also Lage et al. (2000) and Herreid and Schiller (2013).
3 Bishop and Verleger (2013) make this point.
4 See Appendix A (see Supplementary data) for the course learning goals.
We recorded a series of short videos that covered basic concepts in the course. The intent of the videos is to put responsibility on the students to become familiar with foundation material. In general, the videos were designed to cover a specific topic or concept, often as a subsection of one of the relevant chapters in the textbook. Example topics covered in the videos include:

- The loanable funds market
- The money market
- The bond market
- The money supply creation process
- The market for reserves
- The structure of the Federal Reserve
- The Taylor Rule
- The transmission mechanisms of monetary policy

Most videos are around 15–20 min in length and all were recorded in a classroom using Centra so that students could see both the PowerPoint slides and the instructor. We shot over 30 videos and these were about equally split between Gulley and Jackson being the recorded instructor. We spent a great deal of effort figuring out which topics to record as videos. We had to make sure we could boil a topic down to about 15–20 min, that the topic was not too complicated, and that it would not go out of date, at least for a while. Some of our videos, as noted, cover what are likely to be review topics, such as the loanable funds market. Others introduce what is almost sure to be new material, such as the market for reserves, the Taylor Rule, and the transmission channels of monetary policy. As noted by others, we found that the startup costs of doing the videos are indeed quite high. Each of us spent several days creating PowerPoint slides to accompany our videos. Recording the videos took nearly three full days (the absence of assorted technical difficulties would have likely shortened our shooting time by nearly half of a day). Our in house media staff assisted with editing the videos and integrating the video and PowerPoint slides into a single video file. We created a YouTube channel and posted the videos there to maximize their accessibility.\(^5\) To our surprise, we attracted outside viewers and even subscribers.

On the first day of class, we made it clear that class time will not be spent in detailed review of video material and those students who don’t watch the videos in advance of class will be at a severe disadvantage. For example, when covering the reserves market, we quickly (in less than five minutes) go over the unusual shapes of the supply and demand curves. Students who have not watched the videos will not likely be able fully comprehend the model. We can then rapidly move onto applying the reserves market in the context of policy, such as the Fed increasing the target value of the federal funds rate using the interest rate on reserves and the Overnight Reverse Repurchase facility. Of course, some students will not watch the videos in advance without a very direct reason to do so, like a quiz on the material. Informal discussions with students suggest that some feel more comfortable watching the videos after class, rather than before. This behavior might suit the learning style of these students, rather than be an indication of poor study patterns. We also found that students rewatched videos in preparation for exams.

With less time spent on basic material, we also had more time to conduct various in-class activities. For example, Appendix B (see Supplementary data) uses the videos on the bond market to support and in-class assignment that evaluates the impact of large scale asset purchases (LSAPs) on interest rates. Appendix C (see Supplementary data) uses the videos on the market for reserves and policy tools as the basis for student presentations on how various factors affect the market for reserves. A final example is the use of an in-class informal competition between teams of students to answer questions based on a video. A variety of these types of assignments are used throughout the semester. Note that we did not explicitly quiz students or otherwise require them to watch the videos.

It is important to note that we did not do away with all lectures, or even come close to doing so. Rather, our intent was to offload material that changed little from semester to semester, is relatively easy to grasp, and can be delivered in a 15–20 min video.\(^6\) Based on years of experience in teaching this particular course, we believe that putting all, or even most of the lecture material on video format would reduce what students took away from the videos and dramatically increase the cost of pursuing the video-supported classroom method. Moreover, there is a high risk that a large portion of recorded material could become obsolete in a rapidly changing policy environment.

Even prior to administering the surveys to our sections, we were very pleased with our overall experiences, especially considering it was our second attempt at teaching a video supported course. Our class meetings were more interactive, covered a higher level of material, and were just more fun to teach as a result. We also noticed that we were able to cover more material than in previous classes because we could move more quickly through basic concepts and spend more time on complex material and additional topics. However, covering more material is not the objective here; instead it is a happy byproduct.

4. Survey results

\(^5\) See https://www.youtube.com/channel/UCKq4-UX1BfW49ClnPD0dMQ,

\(^6\) Our approach is in the spirit of Norman and Wills (2015).
To evaluate if, and how, the videos contributed to the course, we administered the survey reproduced in Appendix D (see Supplementary data) to students in the spring 2016 semester. We each taught two sections of the course. Another instructor taught two sections of the course using more traditional methods. Appendix C (see Supplementary data) reproduces the surveys given to the students in the video- and non-video supported classrooms during the last 15 min of a class meeting near the end of the semester. Most questions are identical across the surveys with two exceptions. After asking basic demographic questions (questions 1–5), both surveys ask about outside resources employed in the course (questions 6–8). The video-supported classroom survey asks questions about the videos (questions 9a–14a in survey A). The non-video supported classroom survey asks students about their interest in using video supplements (questions 9b–11b in Survey B) to gauge interest in the use of videos. Finally, both surveys contain a variety of questions about students’ overall impression of various aspects of the course (questions 15–21).

Appendix E (see Supplementary data) provides summary statistics of relevant variables. All of the students are senior economics-finance majors and 79% are male. Students expect around a 3.3 (4.0 scale) grade and have an overall GPA of about 3.25–3.50.

A variety of outside class assistance is provided across all sections of the course, most commonly material placed on course Blackboard sites. Taking advantage of extra office hours (OFFICE) and videos (VIDEO, for the video supported sections) apply to about half and three-fourths of the students, respectively. A few students reported using MyEconLab (MYECON) even though none of the three instructors required or even recommended students purchase the software. Some students also reported using online tutorials and/or software (TUTORIAL, DATA_SOFT) of various types. These also were not specifically assigned or recommended by instructors. Thus, some students appear to be searching out resources on their own initiative. Students seemed generally happy with outside help quality (OUTSIDEHELP), ranking such assistance “helpful,” that is, nearly a six on a seven point scale.

We now turn to questions specifically aimed at students in the video supported sections and how they perceived and used the videos. Overall, students watched about half of the videos (VIDEOWATCH), which is of course a necessary condition for the videos to be of use within the context of our use of them. We encouraged students repeatedly to watch the videos by emailing links to relevant videos before each class as a reminder. They also thought that videos were about the right length, with some students finding them too long (VIDEOLENGTH). There also seemed to be about the right number of videos (VIDEONUMBER). We were concerned that students may find videos recorded by the other instructor less useful (or at least perceive them to be so). Fortunately, students seemed to find videos recorded by another instructor (OTHERPROF) to be about equally helpful as those recorded by their own instructor, though there was a slight tendency to view videos not recorded by their own instructor as a bit less helpful. Still, this effect was minor, suggesting that students can get roughly the same benefit from watching other instructors on video. Students also found the videos helpful (VIDEOHELP) and integrated well with the course (VIDEOINTEGRATION). Overall, students seem to like, or at least not mind, the video-supported classroom concept, but there is not yet evidence that learning outcomes are improved.

We asked students in the non-video supported sections about their perceptions regarding the possibility of using videos in the course (questions 9b–11b in survey B) so as to gather information about how about students in non-video supported sections might feel about alternative content delivery and learning methods being employed. Students seemed interested in the idea of having some course content in recorded video form (VIDOPTION1), but were somewhat less sure that it would make for improved use of class time (VIDOPTION2) and expressed moderate skepticism about videos recorded by another professor (VIDOPTION3). Students in the non-video supported sections seemed, at best, to be only mildly interested in the use of videos. One reason for this finding may be that the survey did not describe exactly what the videos might cover, how they might contribute to the course, and how they would be used in the context of a video supported classroom.

We now turn to some simple statistical analysis of the survey results. Table 1 presents comparisons of the responses to questions 7, 8, and 15 through 21 for the video and non-video supported sections. For simplicity, we grouped up the three total instructors into video supported sections (A) and non-video supported sections (instructor C). It is important to note that we are not testing for differences in learning outcomes; rather, we are testing for overall student experience and impressions. Surprisingly, OUTSIDEHELP (question 7) is the same across video and non-video supported. QUALITYOUTSIDE (question 8) indicates that outside help is not significantly better than for the non-video supported versions. Moreover, the other variables evaluating overall course impressions are not statistically different across the video and non-video supported sections. Indeed, the OVERALL variable (question 21) is the same across the different sections.\footnote{We discussed the possibility of each of us using one of our sections as a control group. We concluded that the non-video sections may be materially different in ways beyond just not having videos. Moreover, students share a common Blackboard site, and it would be difficult to “hide” awareness of videos from control groups. Thus, we opted to survey the two sections of the other instructor who did not use videos.}

\footnote{Actual grades are slightly lower, on average.}

\footnote{Carlisle (2010) presents evidence that students of the narrating professor “were more positive about the videos” than were the students of the other two instructors using the videos for their courses.}
Table 1
Video Supported vs. Non Video Supported Sections.

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Variable</th>
<th>Question (N = 81)</th>
<th>Non Video (N = 28)</th>
</tr>
</thead>
<tbody>
<tr>
<td>How much did electronic and online resources provided by the instructor for use outside the class help in understanding important concepts for the course?</td>
<td>OUTSIDEHELP</td>
<td>7</td>
<td>5.95</td>
</tr>
<tr>
<td>The overall quality of instructional resources provided outside the classroom for this class was:</td>
<td>QUALITYOUTSIDE</td>
<td>8</td>
<td>5.87</td>
</tr>
<tr>
<td>The overall quality of instruction for this course was:</td>
<td>CONDUCIVE</td>
<td>15</td>
<td>6.29</td>
</tr>
<tr>
<td>Based on the way this course was structured, and the knowledge gained in this course, how likely is it that you will retain key concepts and applications learned in the course 12 months from now?</td>
<td>TIMEEFFECT</td>
<td>16</td>
<td>6.57</td>
</tr>
<tr>
<td>Based on friends you know of currently taking EC 391 by another instructor, I believe I learned:</td>
<td>RELATIVELYARN</td>
<td>17</td>
<td>3.13</td>
</tr>
<tr>
<td>Overall, from taking this course I have a firm understanding of monetary economics to better understand real world applications, and interpret news and financial market events.</td>
<td>UNDERSTAND</td>
<td>18</td>
<td>6.51</td>
</tr>
<tr>
<td>Based on the way this course was structured, and the knowledge gained in this course, how likely is it that you will have an interest in monetary economics and monetary policy 12 months from now?</td>
<td>INTEREST</td>
<td>19</td>
<td>5.90</td>
</tr>
<tr>
<td>Based on the way this course was structured, and the knowledge gained in this course, how likely is it that you will retain key concepts and applications learned in the course 12 months from now?</td>
<td>RETAIN</td>
<td>20</td>
<td>6.24</td>
</tr>
<tr>
<td>The overall quality of instruction for this course was:</td>
<td>OVERALL</td>
<td>21</td>
<td>6.43</td>
</tr>
</tbody>
</table>

t-tests indicate that the mean responses of the video and non video supported sections are not statistically different at the 5% level. All questions are on a 1–7 scale, with 7 = extremely helpful and similar responses depending on the question, and 1 = extremely unhelpful and similar responses depending on the question.

We checked to see if the results in Table 1 may be driven by differences in overall instructor quality and found that they are not. The results are consistent with the formal instructor ratings that students complete at the end of the semester. Students respond to eight questions, each a one to six scale, with six being the best rating. The instructor of the non-video supported sections received nearly identical ratings. The ratings of Gulley and Jackson, while less similar, are still quite close to each other and with those of the instructor of the non-video supported sections.11 Finally, we found that student responses to the questions in Table 1 were the same across genders. This is unlike Lage et al. (2000) who found that women reported learning more in a flipped classroom.

While our formal statistical tests yielded no material difference between video and non-video supported sections on a variety of metrics, we did find strong anecdotal evidence that students do place significant value on the use of videos. For example, questions 9a and 10a (VIDEOHELP and VIDEOINTEGRATION in Appendix E (see Supplementary data)) indicate that students place a high value on the videos and think that they are well integrated into the course. We suspect that given the way in which students informally reported using the videos (re-watching them, for example), if it were measurable, longer term retention of basic concepts is better in the video supported classroom environment.

5. Conclusions

We adopted a very loose version of the flipped classroom concept, defined as delivering some course material via short video lectures to be watched in advance of attending class, for an upper-level undergraduate economics course. Using a survey administered to both video and non-video supported sections of the course, we find inconclusive evidence of either short term or long term benefits to students in terms of improving understanding of course material, effective use of time in class, and retention of course material. However, we find strong anecdotal evidence that students do place significant value on the use of videos.

Our overall experience was very positive. We intend to make a number of changes to the next version of the course. First, we are going to re-record the videos that turned out to be too long (one video was about 50 min long, for example) so as keep them under 20 min. Second, while the survey results seem to indicate that students watched many or even most of the videos before the appropriate class, we will add incentives to watch the videos, including possibly a short quiz to start class. Third, we will work to enhance student-oriented in class activities to more fully exploit the opportunities offered by using the video supported classroom concept.

10 We administered a previous version of the survey instrument to students in our Spring 2015 semester. There were two non-video instructors who participated whose methods were mainly traditional chalk and talk. While we modified the responses to the survey questions in response to referee comments, the spring 2015 and 2016 surveys are quite similar. In the 2015 version, we found more evidence that supported the use of videos. However, this result could have instead picked up other differences between the instructors that used videos and those that did not.

11 We wondered if students in the non-video supported sections were aware of the videos available to the other sections. As Bentley is a relatively small school and the videos are publicly available on YouTube, this was a possibility. We consulted with instructor of the non-video supported sections and he did not have any evidence that this was taking place. Also, only a few of the students in the non-video supported sections reported using any online videos in question 6.
Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.iree.2016.06.004.

References


