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Main article

Are instructor generated YouTube videos effective in accounting classes? A study of student performance, engagement, motivation, and perception

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ABSTRACT

We examine whether instructor generated YouTube videos improve student performance in a principles of accounting class. We also gather information about student engagement, motivation, and perception. The instructor designed the videos to help students in traditional and hybrid classes to work through financial oriented problems. The instructor also created lecture videos and information videos. We find evidence that video usage improves student performance. This finding is noteworthy since learning is the foremost goal of any instructional method. Students viewed the videos primarily for exam review. Students watched the videos and believed they were helpful and should be used in class. However, students do not necessarily want video classes to replace traditional classes. We make an important contribution by providing information about the usefulness of instructor generated videos to deliver course content.

1. Introduction

1.1. The prevalence of online videos and opportunities for educators

Social media and, particularly, video is commonly used by faculty. Accounting faculty strongly favor videos for instructional use (Ahadiat, 2008) and recorded lessons hold much promise for business educators (Holtzblatt & Tschakert, 2011). Pearson Learning Solutions and Babson College Survey Research Group report that 80% of faculty surveyed use online videos for their classes (Moran, Seaman, & Tinti-Kane, 2011). Online video is the most common type of social media for instruction. Faculty indicate that YouTube and Facebook are the two most widely used social media sources for professional purposes. It is likely that accounting instructors will increasingly use videos for delivering course content (Holtzblatt & Tschakert, 2011).

While there are numerous opportunities for faculty to use online videos in traditional classes, the opportunities are even more prevalent in online classes.[1] Online learning is an important component of education and has grown in importance in higher education in recent years. Increasing numbers of academic leaders believe that online learning is critical to their institution's long-term strategy (Allen & Seaman, 2015). Seaman, Allen, and Seaman (2018) report an increase in distance education enrollments for the fourteenth year in a row, as well as a sharper increase in more recent years. Almost 32 percent of higher

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[1] Online education consists of classes that are completely online, as well as classes that combine traditional face to face and online learning (hybrid or blended).

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education enrollments consist of students taking at least one distance education course. "Blended learning is the inspiration of much of the innovation, both pedagogically and technologically, in higher education" (Vaughan, Cleveland-Innes, & Garrison, 2013, 9).

The increase in online learning highlights the need to more fully explore the use of technology, including instructor-generated YouTube videos, for course delivery. This is the age of technology and advancements are paving the way for more creative teaching methods. Accounting educators must continually reconsider teaching techniques (Holtzblatt & Tschakert, 2011). "Innovative use of technologies creates more effective techniques to distribute learning in non-traditional ways" (AACSB, 2007).

1.2. Challenges

The challenges universities currently face is well documented in the literature. Amirault (2012) indicates these challenges are more prevalent now compared to prior years. Vaughan et al. (2013) point to the rapid rate of change with educational technology as possibly the most significant challenge for educators. Draus, Curran, and Trempus (2014) highlight difficulties particularly with online learning. These difficulties include the faculty-student connection, retention, and faculty perception. Online education requires more effort and faculty are not convinced that online education is worth this extra effort. In fact, faculty perceptions have deteriorated over the years (Allen & Seaman, 2015). Some have questioned the quality of online courses (Myring, Bott, & Edwards, 2014). AACSB (2007) points out that faculty commitment is vital to any online learning program. Mandernach (2009) highlights the complexity of the appropriate use of multimedia in an online course. Similarly, Ahadiat (2008) points out the need for proper planning, skill, and disposition when integrating technology into the curriculum.

1.3. The first accounting course

There is a strong need to more fully understand the role of technology, particularly in accounting classes. The introductory financial accounting class is a logical starting point. Educators and students consider this course to be the gatekeeper course for business majors and acknowledge the high failure rates (Sargent, Borthick, & Lederberg, 2011). "...the inherent difficulty of this first course has often served as a...barrier to entry into the accounting profession. The technical demands of accounting have often lead to discouragement, failure, and overall poor student perceptions of the accounting profession and curriculum" (Jones & Fields, 2001, 532).

The challenges with the first accounting course highlight the need for supplemental instruction (SI) since SI targets traditionally difficult courses (Jones, 2013). Accounting education is continually changing, and accounting educators need to continually determine the best strategies for teaching technical material (Albrecht & Sach, 2000). Holtzblatt and Tschakert (2011) state there is little empirical research on the use of video, especially with financial courses.

The current and forecasted growth of technology in higher education make it essential to ensure that the quality of online accounting education remain equal to traditional in class education (Myring et al., 2014). A connection between technology in the classroom and actual learning is imperative. It is also helpful for faculty to understand whether students use the technology, how they use the technology, and what they think of the technology.

2. Literature review

Several researchers have studied the impact of instructor generated videos on student engagement, motivation, perception, performance, and certain demographic variables. We include a discussion of these variables in the following section. We also include a discussion of the Community of Inquiry (CoI) Framework, as well as a discussion of what makes a video effective.

2.1. Engagement

Student engagement is critical for learning. When faculty integrate video instruction with online learning, students become more engaged and are likely to be more satisfied with the course (Revere & Kovach, 2011). Researchers report high levels of student usage when exposed to online videos and other online learning systems (Draus, Curran, & Trempus, 2014; Kohli, Lancellotti, & Thomas, 2017; Mandernach, 2009; Potter & Johnston, 2006; Sargent et al., 2011). Draus et al. (2014) studied students in a management class exposed to supplementary YouTube videos and determine that students view a large portion of the videos, as measured by YouTube Analytics. Interestingly, Mandernach (2009) reports that while students report using instructor generated online lectures and PowerPoints in an introductory psychology course, quantitative data does not support this reported usage. Holtzblatt and Tschakert (2011) state there is little empirical research regarding video use, especially with financial courses. Accordingly, we exam the frequency with which students watch instructor generated YouTube videos. We also refer to YouTube Analytics to corroborate our findings.

2.2. Motivation

Lack of motivation to complete assignments is a challenge in online learning (Mehta, Makani-Lim, Rajan, & Easter, 2017). Sargent et al. (2011) point out that motivation is one of the most important factors in an introductory financial accounting class since many non-accounting majors are required to take the course and motivation may be low. Digital media that students can access anywhere and at any time may be key in addressing low student motivation. Integrating multi-media, including videos, is a way to enliven a class and increase teaching presence (Das, 2012). Sargent et al. (2011) report that users who viewed short video clips in the introductory accounting class are more motivated than non-users. They recommend that future research explore the motivational aspects of instructor generated videos. Accordingly, we ask students to provide reasons for watching the instructor generated videos in this study so that we can more fully understand student motivation.

2.3. Perception

Video usage has been linked to favorable perceptions (Draus et al., 2014; Griffiths & Graham, 2009; Hsin & Cigas, 2013; Kohli et al., 2017; Mandernach, 2009). More specifically, researchers indicate that instructor generated videos have a positive influence on satisfaction with the overall course (Draus et al., 2014; Griffiths & Graham, 2009). Students report a stronger relationship (Draus et al., 2014; Griffiths & Graham, 2009) and a more personal experience (Mandernach, 2009) with the instructor. Students believe instructor generated videos have significant value (Draus et al., 2014), enhance learning, and help students to be more prepared (Kohli et al., 2017). Perhaps these findings supersede earlier conflicting results using older technology (i.e., VHS tapes) in a financial accounting class (Vamosi, Pierce & Slotkin, 2004). Kohli et al. (2017) state that it's difficult to make definitive conclusions about student attitudes toward video content delivery. Accordingly, we gather student opinions about the instructor generated YouTube videos in this study.

2.4. Performance

Researchers have examined student perceptions. However, the information these researchers have gathered is helpful only to a degree (Potter & Johnston, 2006). Perhaps the most fundamental question is whether students will learn more using instructor generated videos. Employers, professional accreditation bodies, and others in higher education have made calls to more fully explore the impact of teaching strategies, particularly online learning systems, in enhancing student learning outcomes (AACSB, 2007; Michlitsch & Sidle, 2002; Potter & Johnston, 2006).

Etter, Burmeister, and Elder (2000), Jones and Fields (2001), Parker and Cunningham (1998) indicate that SI in accounting courses enhances student performance. For students in the traditional class, the YouTube videos are available to the students to reinforce what they learn after attending live classes. Accordingly, these videos serve as SI and, therefore, likely enhance the learning experience of these traditional students.

Researchers (Hsin & Cigas, 2013; Sargent et al., 2011) report lower course drop rates and higher pass rates or higher grades for students exposed to videos in principles of computer and accounting courses, respectively. Researchers (Fordham, 1996; Potter & Johnston, 2006; Sargent et al., 2011) also report improved exam performance with higher usage of online videos and other technology in accounting courses. Although Sargent et al. (2011) report statistically significant findings, they also point out that improvement is only moderate. They state that video usage has only low to moderate practical significance. Other researchers (Draus et al., 2014; Mandernach, 2009; Vamosi, Pierce & Slotkin, 2004) report no significant relationship between instructor generated videos and student performance in courses other than accounting.

There are several limitations with the above studies. Except for Sargent et al. (2011), researchers focused on non-accounting classes or used more dated technology. Given the rapidly changing state of technology, it is important to understand the impact of the latest technological innovations and update findings from prior studies. Today's students have likely grown up using videos all their lives and this trend is changing the way we teach students and the way students learn. Our study differs from the Sargent et al. study in terms of the specific accounting course, the timing of the pre-test, and the specific technology used. We study the first principles of accounting course, we administer the pre-test during the first week of classes, and we us YouTube videos.

2.5. Demographics

Prior researchers (Jones, 2013; Kohli et al., 2017; Potter & Johnston, 2006; Sargent, Borthick, & Lederberg, 2011) have included such demographic variables as major and gender. Accordingly, we include course major and gender in our study. We also include course format and participation in athletics as variables since we examine students in both traditional and hybrid accounting courses and since we examine a large proportion of athletes who face the additional demands during the semester.

2.6. The community of inquiry framework

We examine instructor generated YouTube Videos for delivering course content within the context of the CoI Framework. The CoI was originally described by Lipman (1991) and draws from the works of earlier theorists (e.g., Piaget, Dewey, Peirce).

"The community of inquiry is perhaps the most promising methodology for the encouragement of that fusion of critical and creative cognitive processing known as higher-order thinking" (Lipman, 1991, p. 204). Researchers expanded and applied the ideas of Lipman, Dewey, and others to online learning in a project that originated at the University of Alberta (Mehta et al., 2017).

The CoI emphasizes three elements in an online learning environment. Each of the three mutually reinforcing elements converge to form a collaborative educational student experience: Social presence, cognitive presence, and teaching presence. Social presence is the ability of participants to project their personal characteristics into the community and present their real personality. It reflects a supportive context for students to express emotions, communicate, and experience group cohesion (Garrison, Anderson, & Archer, 2000).

Given the nature of our study, we focus primarily on cognitive and teaching presence. Cognitive and teaching presence influence student learning and satisfaction (Akyol & Garrison, 2011). Cognitive presence is basic to success in higher education and is vital for critical thinking (Garrison et al., 2000). Cognitive presence is "the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained communication" (Garrison et al., 2000, p. 89). Cognitive presence becomes particularly important when the type of communication changes. In this study, the change in communication is the use of instructor generated YouTube videos.

Teaching presence involves facilitating and designing the educational experience. The primary role of the instructor is to select, organize, and present course material, and to develop learning activities when designing the educational experience (Garrison et al., 2000). Teaching presence is the unifying force that brings together the social and cognitive elements. The CoI Framework begins with creating a well-designed course where students feel close to the instructor through direct instruction. Teaching presence in the online classroom exists when students knows the instructor is present and attending to the class (Baker & Taylor, 2010/2012). Shared responsibility implies that both teachers and students are active participants and take responsibility for learning (Vaughan et al., 2013). Teaching presence likely plays a central role in student satisfaction and learning, particularly in a distance learning environment where peer-induced participation is lacking (Bush, Castelli, Lowry & Cole, 2010; Mehta et al., 2017). AACSB (2007) recommends personal interaction of some sort. Video content is an important way to increase teaching presence (Baker & Taylor, 2010/2012) and, therefore, enhance learning (Draus et al., 2014). Teaching presence may explain an increase in student engagement with online material that involves multimedia to create a more personalized learning experience (Mandernach, 2009).

2.7. Effective videos

Many studies have shown that instructional videos can be a highly effective educational tool (e.g., Hsin & Cigas, 2013; Kay, 2012; Lloyd & Robertson, 2012; Rackaway, 2012). Effective videos are designed and implemented by balancing three elements: cognitive load, student engagement, and active learning (Brame, 2015). Cognitive Load Theory by Sweller (1988), Sweller (1989), and Sweller (1994) assumes a limited working memory and unlimited long-term memory. A learner's working memory is where patterns of thought can be organized into categories of information called schemas. The learner stores these schemas into long-term memory and uses these schemas when needed. Since working memory is limited, the learner must be selective about what information on which to focus (cognitive load). Approximately seven items can be processed in working memory. Once the learner organizes these individual patterns into schemas, the learner can recall these patterns from long-term memory as one item. The construction of schemas to manage cognitive load has important implications for creating educational videos. Cognitive Theory of Multimedia Learning, which builds on Cognitive Load Theory, introduces the concept of cognitive processing. The individual uses two channels to acquire and process information: a visual/pictorial channel and an auditory/verbal processing channel (Mayer & Moreno, 2003).

Videos can be an effective tool for learning. When incorporating videos into a lesson, instructors should consider the three key components that will make the video more compelling to the student: cognitive load, elements that impact engagement, and elements that promote active learning. We consider these three elements and make several recommendations. We incorporate these recommendations in the YouTube videos:

- Keep videos targeted on learning goals.
- Use audio and visual elements to explain material.
- Use signaling to highlight important ideas or concepts.
- Use a conversational, enthusiastic style to enhance engagement.
- Embed videos in a context of active learning by using guiding questions, interactive elements, or associated homework assignments.

3. Research questions and hypothesis

The overall goal of this study is to determine whether instructor generated YouTube videos improve student performance in a principles of accounting class. We also gather information about student engagement, motivation, and perception We first obtained descriptive information to address the following research question:

Research Question: When exposed to instructor generated YouTube videos – How frequently will the students view the videos? What is their motivation? What are their perceptions?

We then obtained empirical information to determine whether student learning is enhanced by the videos. We tested the following hypothesis:

H: Students who watch videos will improve their exam grades more than students who do not watch the videos.

In the first instance, we use a research question since our overall goal is to gather information about student engagement, motivation, and perceptions. The nature of this is more exploratory, as opposed to predictive. With motivation, for instance, we are more interested in identifying *why* students are motivated to watch the videos, as suggested by Sargent et al. (2011). In the second instance, we use hypothesis testing since research indicates video viewing is likely to result in higher student exam grades. Given the predictive nature of this, we believe hypothesis testing is more appropriate.

4. Method

4.1. Participants

Participants, as reported in Table 1, were undergraduate students from a private four-year university in the southeast. Students listed a variety of business majors, including accounting and/or finance (16 percent). A larger portion of students were enrolled in the traditional course format (78 percent) and did not participate in athletics (64 percent).

Although only a small proportion of students were accounting and/or finance majors, we believe the results of our study make an important contribution to accounting education for several reasons. First, this course is one of the first business classes students take and is considered the gatekeeper course for business majors. The significance of this course is highlighted especially given the high failure rate. It is critical for accounting educators to capture the interests of students in this course and to help students understand the material before students move onto subsequent business courses. Second, there is the potential for some of these students to become accounting majors since most business students take this course as freshman and sophomores. Third, educational institutions typically employ a significant portion of accounting resources for this course since this course is a required course for all business majors. For all these reasons, this first accounting course is an important course for all business majors and accounting instructors play a crucial role in effectively delivering course content.

4.2. Procedure – Creating instructor generated YouTube videos for a course

We exposed students in multiple sections of a Principles of Financial Accounting class taught by the same instructor to instructor generated YouTube videos. Students were enrolled in either a traditional face-to-face course or a hybrid course that combined online material with weekly face to face instruction. The traditional class met one hour three times a week and the hybrid class met one hour only once each week.

The instructor recorded live class sessions and uploaded these videos onto YouTube. The instructor completed accounting problems using Excel or Word, lectured on new subject material, reviewed material for upcoming exams, and created administrative videos (e.g., to review the syllabus and course outline). The students were able to hear the instructor's voice while they watched the instructor's computer screen. The instructor referenced the textbook throughout the recordings. While there were only a few administrative videos, there were numerous lessons where the instructor worked through accounting problems. The average video length was approximately ten to fifteen minutes. Administrative videos were the shortest and

Table 1
Sample distribution and attributes.

Distribution	N	%
Total number of participants	246	100.00
2014–2015	101	41.06
2016–2018[a]	145	58.94
Attributes	N	%
Major		
Accounting and/or finance	39	15.85
Others	207	84.15
Course format		
Hybrid	53	21.54
Traditional	193	78.46
Athlete		
Yes	88	35.77
No	151	61.38
Missing	7	2.85

[a] Starting in 2016, we obtained data on student performance using a pre-test and post-test, as well as self-reported initial exam grades. Prior to 2016, we obtained only self-reported expected final exam grades.

recorded lessons involving spreadsheets were the longest, given the nature of the lesson. The instructor recorded the videos using Zoom,[2] uploaded all videos to YouTube and linked the videos to Blackboard. Since the videos were not publicly available, the students accessed the videos only through Blackboard.

The instructor recorded the live classes from a prior semester. The live format enabled the instructor to capture the types of questions students ask and to adequately allow for timing so that students could work through the problems with the instructor. Students were given the opportunity to watch the videos on their own time. In the traditional face to face class, the videos duplicated the live lectures and were, therefore, optional for the students. The primary purpose of the videos was to reinforce material from live classes and, therefore, serve as a refresher. The videos were also a back-up for students who missed a class. In the hybrid class, the videos were the primary means of course delivery for almost two thirds of the classes. The weekly live classes gave hybrid students regular and continuous contact with the professor. Hybrid students had the same opportunity as traditional students to see the professor during office hours, ask the professor homework questions using the textbook software, or email the professor any questions throughout the semester.

4.3. Survey instrument

At the end of each semester 2014–2018, we obtained anonymous feedback from students by administering a survey about engagement (i.e., viewing frequency), motivation, perception, and demographics (i.e., major, course format, athlete, and gender). The instructor initially designed the survey solely to obtain student feedback about the course. Based on positive student feedback, we decided to use the survey for research. We validated our instrument with Cronbach's Alpha test.[3] We also used YouTube analytics to obtain aggregate information to supplement the survey data about student engagement.

4.4. Performance data

We expanded the study starting 2016 to include performance data. We measured student performance using actual grades based on the pre-test administered at the start of the semester and a post-test administered at the end of the semester. As an additional measure, we asked students to self-report both their first exam grade and their expected final exam grade. We obtained performance data from 145 students. The total sample size is 246. While Sargent et al. (2011) used actual first exam and final exam grades, Sargent et al. recognized that students may view the videos substantially prior to the first exam. The actual pre-test measures knowledge as of the first week of class without any student preparation, whereas the self-reported first exam grade measures knowledge several weeks after the start of the semester. While the pre-test/post-test provides a more accurate measure of student performance, the self-reported grades also incorporate student expectations about grades.

5. Analysis and results

Student surveys, supplemented with YouTube analytics, reveal information to determine student engagement, motivation, and perceptions. Given the difference in class formats, we report the results separately for traditional (hybrid) students. When discussing the results, we denote the results for hybrid students in parentheses unless otherwise noted.

The survey includes nine questions. Question results are presented in an integrated format. Overall presentation is organized by sub sections of Section 5, Analysis and Results. Sub sections are identified as follows.

- 5.1 Student engagement (Q1 and Q2)
- 5.2 Motivation (Q3 and Q4)
- 5.3 Perceptions (Q5, Q6, Q7, Q8, and Q9)

Analysis for sub sections 5.1–5.3 begins with overall discussion of results. Discussion comments are supported by data analysis for each question included in the sub section. Sub section 5.4 Performance includes results of two tests: a comparison of mean and median measures of participant perceived grades and results of multivariate regression analysis.

5.1. Student engagement (Q1 and Q2)

As reported in Table 2, a majority of students report viewing the videos to some degree (Q1). Approximately 25(49) percent of students report viewing the videos frequently to somewhat frequently. On a scale of one (not at all) to five (very frequently), the average score was 2.74 (3.28). Although we do not report these results in the tables, we find that YouTube analytics support that hybrid students viewed the videos more than traditional students since viewings increased during those semesters when hybrid classes were offered.

[2] Zoom is cloud video conferencing software.

[3] The variances of some variables vary widely and researchers commonly use the standardized score to estimate reliability. The standardized alpha coefficient provides information about how each variable reflects the reliability of the scale with standardized variables. Our overall standardized Cronbach's alpha is 0.81, which is much greater than the suggested value of 0.70 given by Nunnally and Bernstein (1994).

Table 2
Student engagement.

Course format	Traditional		Hybrid	
	N	%	N	%
Q1: To what extent did you watch any of the videos?				
5. Frequently	20	10.36	10	18.87
4. Somewhat frequently	29	15.03	16	30.19
3. Occasionally	52	26.94	9	16.98
2. A couple of times	65	33.68	15	28.30
1. Not at all	27	13.99	3	5.66
Total	**193**	**100.00**	**53**	**100.00**
Mean	**2.74**		**3.28**	
Q2: If you answered "Not at all", then Why Not? (more than one answer may be chosen)				
Class & assignment were sufficient	20	10.36	2	3.77
Relied on other methods	22	11.40	3	5.66
Lack of time	15	7.77	2	3.77
Lack of interest	3	1.55	1	1.89
Other	4	2.07	0	0.00

Few traditional students did not view the videos at all. The number of hybrid students reporting this was sufficiently small and we, therefore, do not discuss these results. Traditional students often provided multiple responses, including relying on other methods, relying on class time and assignments, and lack of time. Lack of interest was not an issue (Q2).

5.2. Motivation (Q3 and Q4)

Students overwhelmingly watched the videos for exam review and, particularly, the final exam review (Q3) as reported in Table 3 While not disclosed in the table, YouTube analytics support the high percentage of viewers and the highest duration of views for exam review. A majority of students also report watching the videos after an absence (both excused and unexcused) and, to a lesser degree, for reinforcement after a live class.[4] To gain further insight as to student motivation for watching videos, we asked students if watching a video needed to be part of a graded assignment (Q4). We found mixed results.

YouTube analytics reveal that while there were numerous views of recorded live lessons, students watched only approximately half of each video on average. The duration of videos watched in order of highest to lowest were as follows: exam review, administrative/"how to", information lessons, and accounting problem lessons.[5] The administrative videos and exam review videos tend to be more directly related to grades compared to actual lessons.

5.3. Perceptions (Q5, Q6, Q7, Q8, Q9)

Almost all students believed the videos were helpful to some degree (Q5), as reported in Table 4. The average score was 4.15 (3.89) on a scale of one (not helpful at all) to five (very helpful). In the comment section of the university's end of course student evaluation, a number of students included comments about the videos, such as the following:

> *I appreciate her effort in making a video of all her classes available for students online and on YouTube. I understand that this is a whole lot of work, but I find this very effective and of great assistance to students lagging behind.*
> *From her in-class lectures to watching her recorded lectures online when I miss due to athletic travel, I always had a way to learn the material and excel in this course.*

A smaller portion of all students, regardless of class format, used other non-required online supplements (Q6). We found that 85 percent of all students who reported the videos to be helpful did not use any other voluntary on-line textbook supplements.[6] We determined this by using a Cross-Tab Analysis, but we do not report this analysis in the tables. The videos, therefore, served as the SI for the traditional students. Almost one-third of students who did not believe the videos were helpful (Q7) used other voluntary on-line textbook supplements.

Almost all students recommend the use of videos for future class (Q8). While students overwhelmingly recommend videos for future classes, they are fairly split as to whether they would like to see more classes in video format versus live classes (Q9). Students who did take a hybrid classes reported reasons such as flexibility and time management.

[4] As expected, few hybrid students reported this.
[5] Exam review (74 percent); administrative/"how to" (66 percent); information lessons (47 percent); and accounting problem lessons (53 percent).
[6] P-value for Pearson Chi-square was 0.0844 and significant at $p < 0.10$.

Table 3
Motivation.

Course format	Traditional		Hybrid	
	N	%	N	%
Q3: Reason for watching (more than one answer may be chosen)				
Excused absence	64	33.16	14	26.42
Unexcused absence	72	37.31	20	37.74
Exam review	108	55.96	38	71.70
Learn the material (hybrid) or Reinforce material after class (traditional)	47	24.35	4	7.55
Required for cancelled class	20	10.36	0	0.00
Q4: Does a video have to be directly related to a graded assignment?				
Yes	69	37.91	22	44.00
No	113	62.09	28	56.00
Total	**182**	**100.00**	**50**	**100.00**

Table 4
Perceptions.

Course format	Traditional		Hybrid	
	N	%	N	%
Q5: To what extent did you find the videos helpful?				
5. Very helpful	48	27.27	17	32.69
4. Helpful	70	39.77	12	23.08
3. Somewhat helpful	39	22.16	18	34.62
2. Neutral	17	9.66	5	9.62
1. Not helpful at all	2	1.14	0	0.00
Total	**176**	**100.00**	**52**	**100.00**
Mean	**4.15**		**3.89**	
Q6: Do you think instructions and explanations are easier to understand in video format?				
Yes	109	62.64	33	63.46
No	65	37.36	19	36.54
Total	**174**	**100.00**	**52**	**100.00**
Q7: Did you use any other non-required online textbook supplements?				
Yes	45	24.73	13	25.00
No	137	75.27	39	75.00
Total	**182**	**100.00**	**52**	**100.00**
Q8: Would you recommend videos for future classes?				
Yes	173	95.05	47	90.38
No	9	4.95	5	9.62
Total	**182**	**100.00**	**52**	**100.00**
Q9: Would you like to see more classes in video format versus live classes?				
Yes	83	45.86	22	43.14
No	98	54.14	29	56.86
Total	**181**	**100.00**	**51**	**100.00**

5.4. Performance

To determine whether there are any statistically significant variables that explain improved student perceived grades over time, we performed univariate tests in Table 5 on academic performance. We found more improvement for accounting/-finance majors, students enrolled in the traditional class, and non-athletes.

We performed a multivariate regression analysis,[7] as reported in Table 6. Based on prior literature, we included additional student demographic variables (i.e. major, course format, athlete) to control for confounding effects. We find evidence to support our hypothesis that video usage improves students' academic performance even when we control for self-selection bias as we show in model (1) of Table 6. We find robust results even when we substitute the dependent variable, Perceived Grades, with Actual Grade Change in model (2),[8] as well as with two additional control variables, required class and gender in model (3).

[7] Students may choose to watch a video due to a variety of reasons. It is possible that student will be more likely to watch videos that directly affect their grades (Q4), are perceived as being helpful (Q5), or provide instruction that is easier to understand in video format (Q6). Also, students may be influenced by the availability of non-required online textbook supplements (Q7). To control for self-selection bias, we employed Hackman's 2-stage procedure using the maximum likelihood method and included it in the regression analysis.

[8] The sample size is relatively smaller in models (2) and (3) than model (1) because we started measuring *Actual Grade Change* in 2016.

Table 5
Comparison of mean and median measures of participant perceived grades.

	N	Mean	Median	Std Dev	t-statistics
All	146	84.38	85.00	8.51	155.49***
Study					
Study 1 (2014FA-2015FA)	101	83.69	85.00	9.00	93.46***
Study 2 (2016FA-2018SP)	145	84.86	85.00	8.15	125.35***
Difference		−1.16	0.00		−1.04
Major					
Accounting and/or finance	39	87.18	85.00	7.68	70.92***
Non-accounting and/or finance	207	83.85	85.00	8.57	140.70***
Difference		3.33	0.00		2.44**
Course format					
Hybrid	53	81.38	75.00	9.45	62.67***
Traditional	193	85.20	85.00	8.07	146.74***
Difference		−3.82	−10.00		−2.69***
Athlete					
Yes	88	83.13	85.00	8.49	91.89***
No	151	84.68	85.00	8.24	126.36***
Difference		−1.56	0.00		1.38

One sample T-test, Satterthwaite unequal variance.
*, **, ***Significance at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.

Table 6
Multivariate regression analysis.

Dependent variable	(1) Perceived grade	(2) Actual grade change	(3) Actual grade change
Intercept	77.03***	67.41*	67.13*
	(15.15)	(1.89)	(1.87)
Watch videos or not?	4.19**	15.54*	16.42*
	(2.04)	(1.68)	(1.73)
Major	3.73***	0.88	2.08
	(2.60)	(0.14)	(0.32)
Course format	−4.06***	−17.35***	−18.04***
	(−3.15)	(−2.95)	(−3.03)
Athlete	0.84**	0.49	1.51
	(2.24)	(0.18)	(0.38)
IMR	9.98799	−130.01	−124.44
	(0.86)	(−1.20)	(−1.14)
Required			−3.89
			(−1.21)
Gender			2.17
			(0.51)
Observations	246	136	135
Adjusted R-squared	0.0839	0.0585	0.0549
F-test	5.30***	2.68**	2.11**

IMR is the Inverse Mills Ratio, calculated from the first-stage estimation of the Hackman method to control for sample self-selection bias. ***Perceived Grade*** is the student's expected final exam grade. ***Actual Grade Change*** is the difference between pre-test and post-test. The researchers measured student performance using actual grades based on the pre-test administered at the start of the semester and a post-test administered at the end of the semester. Robust t-statistics in parentheses;
*,**,***Significance at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.

6. Discussion, limitations, and suggestions for future research

6.1. Contributions

We make several contributions to existing research. Most importantly, our research indicates that instructor generated YouTube videos improve student performance. This finding is noteworthy since learning is the foremost goal of any instructional method. This finding is also consistent with some prior research with online videos and other technology in accounting courses (Fordham, 1996; Potter & Johnston, 2006; Sargent et al., 2011). Unlike some of these studies, however, our study focuses on the most current technology in an age characterized by constant and rapid change. Today's student has most likely grown up using YouTube videos regularly for entertainment and information. Students have a high degree of comfort with YouTube videos and we demonstrate the usefulness of this technology as an education tool. In doing so, our findings help to satisfy the requests from employers, professional accreditation bodies, and others in higher education to more fully explore the impact of online learning systems (AACSB, 2007; Michlitsch & Sidle, 2002; Potter & Johnston, 2006).

The large frequency with which students view videos is encouraging. It is not surprising that accounting and finance majors are more likely to view the videos, although this finding is not consistent with findings reported by Sargent et al. (2011). The assumption is that these students would be more motivated to learn the material. When students choose not to view the videos, they provide justifiable reasons. Lack of time seems to be more of an issue than lack of interest.

This study is an attempt to more fully explore the motivational aspects of instructor generated videos, as suggested by Sargent et al. (2011). While Sargent et al. suggests that users are strategic when viewing certain topics, Sargent et al., looked solely at instructional videos of course materials. We also incorporate exam reviews and administrative videos. All students, regardless of class format, were similarly motivated to watch the videos to review for exams. This finding is consistent with Kohli et al. (2017), who reported that students used online videos more than the online study guide or textbook when studying for exams. Student use of online videos for exam review indicates that instructor generated videos have a place in not only online classes, but also traditional classes. Fordham (1996) points out there is large variation in students' need for review. When using videos for exam review, students can selectively view materials. Students can rewind topics they do not fully understand and skip topics they have already mastered. Students need not be hesitant to ask questions in class for fear of holding back the class. Selective viewing is, perhaps, the most compelling advantage of using videos. Exam review via video format also allows more time in the classroom for other tasks.

Although many students report that video usage is not directly related to a graded assignment, the findings imply the opposite is true. Students watched a higher duration of administrative and exam review videos and these videos tend to be more directly related to grades compared to actual lessons. This finding is consistent with findings reported by Jones and Fields (2001), who reported that SI usage increased when they incorporated SI attendance into student grades.

We are encouraged by the favorable perceptions reported by students overall, regardless of class format. The favorable perceptions reported by accounting and finance majors imply that videos might be particularly useful in upper level accounting classes given. Fordham (1996) points out that upper level accounting classes are highly technical in nature. Videos have the potential to reduce required resources without losing educational effectiveness, given the extensive use of review in junior and senior level courses.

6.2. Limitations and delimitations

There are several limitations of this study. Mandernach (2009) points out the complexity of the appropriate use of multimedia in online teaching. In this study, we focused on videos used in the first principle of accounting course. Other researchers have focused on different accounting courses, different variations of SI, and different class formats (i.e., completely online). The positive views reported by accounting and finance majors in this study imply a need to more fully explore the use of instructor generated videos in upper level accounting classes. The results of this study may not necessarily apply to other types of classes and other types of lesson and course formats.

We did not obtain information about students' learning preferences or video length. It is possible that learning preferences impact a student's response to their learning environment. It is also possible that video length and/or number of videos impact a student's likelihood of viewing a video, as well as the portion of video viewed. Interestingly, YouTube analytics reveal that students watched only approximately one half of each video on average. This data would suggest that students prefer short videos. However, YouTube analytics also reveal that students watched on average almost 75 percent of each final exam review video, which tended to be longer in length and more directly related to grades. We recommend researchers more fully explore learning preferences, video length and number of videos.

6.3. Overall

Overall, we are encouraged by the results since they imply that instructor generated videos serve a useful purpose in both hybrid *and* traditional accounting classes. Instructor generated videos have numerous benefits to both students and instructors. From a student's perspective, videos allow students to selectively view material for exams, as previously discussed. Fordham (1996) adds that the student can be free of distractions when viewing videos outside the classroom and can manipulate physical factors to create an individualized atmosphere. Holtzblatt and Tschakert (2011) indicate that videos help students with diverse learning styles to comprehend concepts and retain information. Griffiths and Graham (2009) point out that the student can view the video according to his or her own schedule.

Since the students in this study viewed pre-recorded live classes, these students did have the benefit of hearing typical questions asked by other students. While these students could not get immediate answers to their own questions while viewing these videos, these students could potentially benefit from the verbal and nonverbal elements in the video and could ask questions electronically. Alternatively, instructors can create a discussion board where students can post question to the instructor as questions arise. In addition, instructors can use technologies such as Zoom to facilitate face-to-face question and answer sessions. Skype is another option, as it facilitates text chat, audio, and video interaction. Office hours can be in person or virtual. All these options help to develop positive levels of immediacy and social presence. These options may, therefore, motivate students in more personal environments.

Instructors can implement videos with minimal use of time if the instructor records live classes. Once the instructor recorded the live classes in this study, the instructor spent minimal additional time performing minor editing if needed, uploading the videos onto YouTube, and providing links on Blackboard. Instructors can use these videos for multiple sections

of the same course and for multiple semesters. For a summary of major educational benefits of video technology in the classroom, see Holtzblatt and Tschakert (2011). Efficiency is especially important given Allen and Seaman (2015) finding that 78 percent of survey respondents report that additional efforts required to deliver an online course represents a barrier for online instruction. A continuing failure of online education has been its inability to convince faculty of its worth. This lack of acceptance has not shown any significant change in over a decade. Current results show the problem is getting worse. This research contributes to existing research since it provides information to help instructors more fully understand the value of instructor generated videos in a course.

In a call to action to accounting educators, Holtzblatt and Tschakert (2011, 119) state "Encouraging professors to experiment with Skype and online videos as a starting point is virtually risk-free. We encourage accounting professors to explore and become familiar with these developments and opportunities as the use of video technologies can provide stimulating complements to traditional accounting education." The present study is a step in that direction and helps provide information in response to the call for action.

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