A Pilot Study of Short Computing Video Tutorials in a Graduate Public Health Biostatistics Course

Lauren Hund
University of New Mexico

Christina Getrich
University of Maryland

Journal of Statistics Education Volume 23, Number 2 (2015)
www.amstat.org/publications/jse/v23n2/hund.pdf

Key Words: Hybrid learning; Public health education; Short videos; YouTube .

Abstract

Traditional lecture-centered classrooms are being challenged by active learning hybrid curricula. In small graduate programs with limited resources and primarily non-traditional students, exploring how to use online technology to optimize the role of the professor in the classroom is imperative. However, very little research exists in this area. In this study, the use of short statistical computing video tutorials was explored using a pilot study in a small Public Health Program at the University of New Mexico. The videos were implemented in two Master's-level biostatistics courses and student perception of the videos was assessed using quantitative surveys and qualitative focus groups. The results from 16 survey respondents and 12 focus group participants are presented across the two courses. Viewing rates for the videos were high, with 15 out of 16 respondents reporting usually or always viewing the videos. Overall perception of the videos as a learning tool was positive, with 14 out of 16 respondents agreeing that the videos offer advantages to them. Two prominent themes emerged in our analysis: (1) the usability and convenience of the videos and (2) the deeper learning facilitated by having the videos available. We conclude that the short video tutorials were a useful learning tool in our study population.

1. Introduction

Biostatistics forms the backbone of many public health investigations, and learning basic statistics is a key component of many Master's-level public health programs (PHPs) (Fineberg et al. 1994). As innovations in online learning advance, the use of technology to promote statistics and biostatistics education has followed in suit (Larreamendy-Joerns et al. 2005). Most studies have not found significance differences in student outcomes between online, hybrid, and traditional courses (Russell 1999 Utts et al. 2003 McLaren 2004 Ward 2004 Summers et al. 2005 McGready and Brookmeyer 2013). However, some studies suggest that student attitudes toward online classes are less positive (Yablon and Katz 2001 Utts et al. 2003 Summers et al. 2005) and that the amount of professor interaction time may play a role in student satisfaction (Tudor 2006). Most research examining the use of online technology to enhance statistical learning has occurred in introductory statistics courses, with little research in the graduate public health setting (McGready and Brookmeyer 2013). The limited existing graduate public health research pertaining to online or hybrid education is primarily generated from large schools of public health (Enders and Diener-West 2006 Evans et al. 2007 McGready and Brookmeyer 2013) and may not be generalizable to smaller programs. Small PHPs often have limited monetary and personnel resources and consist of primarily non-traditional students. Using online technology within small PHPs may help optimize the role of the professor in the classroom.

The University of New Mexico (UNM) PHP is a small program offering only a Master's of Public Health (MPH) degree and is housed within the UNM School of Medicine. This PHP is aimed at providing leadership in graduate and community-based education to improve the health of diverse populations in the region. The PHP awards 13.3 MPH degrees on average per year (since 2007). The student body consists of mainly in-state residents (75.2%) and females (74.3%). Students in the PHP generally work full- or part-time jobs while pursuing their Master's of Public Health (MPH) degree. Due to the busy schedules of the students, the PHP is currently exploring ways to integrate more online components into the curriculum.

Short video tutorials are commonly used by the largest producers of massive online open courses (MOOCs) including EdX, Khan Academy, and Coursera. DeVaney (2009) used video tutorials to supplement an online statistics class and concluded that the videos were well-received among students. When piloting video tutorials for an introductory computer science course, Carlisle (2010) found that using video tutorials freed up time for in-class discussions; further, students in the section with the professor who recorded the videos performed best, emphasizing the importance of professor interaction in conjunction with the tutorials. These existing studies did not use qualitative data analysis to assess student perceptions of video tutorials. We did not find any existing literature regarding the value of using short video tutorials for teaching statistics computing in traditional classroom

settings nor for teaching in the context of a resource-limited graduate PHP.

The goal of the present pilot study is to evaluate student perceptions of using short statistical computing video tutorials as a teaching tool in a small graduate PHP made up of primarily non-traditional working students. The tutorials were implemented in two Masters'-level biostatistics courses: an introductory course and a more advanced regression course. We hypothesized that the students would consistently use, prefer, and benefit from the online video tutorials. A mixed-methods study design was used, and quantitative survey data was triangulated with qualitative focus group data to evaluate student usage patterns and perceptions of the videos. This paper summarizes the implementation of the video tutorials and the major themes regarding students' perceptions of the videos as a learning tool.

2. Methods

2.1 Course Description

The video tutorials were implemented in two biostatistics courses designed for Master's-level public health students with a range of quantitative backgrounds during the 2013-2014 academic year. The first course during Fall 2013 was a general introduction to biostatistics, and the second course during Spring 2014 covered regression and survival analysis. These two courses are referred to as BIO1 and BIO2, respectively. Students were required to have at least one undergraduate statistics course to enroll in BIO1 and one graduate-level statistics course to enroll in BIO2. Time since taking the pre-requisites and overall comfort with quantitative subjects varied between students.

Master's-level biostatistics courses are typically comprised of two components: conceptual material and computing instruction. This instruction format was used for both of the courses. The classes met twice per week in a computer lab with access to computing software. The BIO1 course was 1.5 hours and BIO2 course was two hours (1.5 hours of lecture with a .5 hour in-class student-led problem solving session). The instructor held two one-hour office hours per week. In both courses, students were evaluated based on weekly homework assignments and two exams. In BIO2, students also completed a project. The courses were taught by the same instructor who was responsible for all teaching activities (the PHP program generally does not have the resources to provide instructors with teaching assistants). The Stata statistical software package v13 was used for data analysis in both courses (StataCorp 2013).

2.2 Study Population

Participants in the study consisted of students enrolled in either or both courses. All students in the PHP are required to take BIO1 (unless they have sufficient statistical backgrounds to waive the course). Students enrolled in the epidemiology concentration within

the PHP are required to take both courses. Additionally, graduate students from other departments at UNM can enroll in the courses. The target population for the study was defined as students enrolled in at least one of the two courses during the 2013-14 academic year.

2.3 Study Design

Designing studies to evaluate hybrid and online statistics learning experiments is challenging (Abrami and Bernard 2006). Many existing online and hybrid education studies compare self-selected traditional versus online students (Utts et al. 2003 McLaren 2004 McGready and Brookmeyer 2013), leading to potential selection bias (DeVaney 2010). To address these study design challenges, a mixed-methods design was used in which all students received the video tutorial intervention to avoid contamination between students. In-class and online demonstrations were alternated in blocks to allow students to experience the course material both with and without video tutorials. For instance, in BIO2, linear regression and survival analysis were taught with video tutorials, whereas logistic regression was taught without the tutorials. During weeks without the videos, blocks of time were set aside during class for computing demonstrations with students following along on computers (similar to traditional statistics labs). Students would take notes on computing exercises using handouts provided by the instructor. During weeks with the videos, computing was briefly demonstrated by the instructor during class as a part of the traditional lecture, and then students accessed Stata tutorial video sequences through the online course website. Some feedback from the BIO1 semester was incorporated into the BIO2 implementation of the video intervention; the main differences between the courses included shortening the videos and focusing on one concept per video in BIO2. Additionally, BIO2 contained a 30-minute student-led problem solving session at the end of each lecture per student request. Lastly, the BIO2 course webpage was structured slightly differently for simpler navigation by students. We consider this a pilot study due to the non-randomized design and adaptive roll-out of the intervention, along with the small sample size.

2.4 Video Tutorials

All of the videos were filmed during the 2013-2014 academic year designed specifically for the BIO1 and BIO2 courses, aside from six introductory Stata videos filmed in 2012 by the instructor for an EdX MOOC. The course videos were filmed on a tablet PC using CamtasiaStudio for screen-capture with annotations using a stylus. Videos were edited in Camtasia and uploaded to YouTube. To quantify the time investment required to make the videos, the instructor estimated the amount of time spent per unit of video-time after familiarizing herself with the Camtasia software. After the videos were posted, students could watch the videos outside of class and had access to the videos for the duration of the course. To track video usage, the number of YouTube video views was monitored for

each video. The videos were unlisted (not available to the public) on YouTube during the two courses so that video usage could be tracked and attributed directly to the students. The videos are now public and can be viewed at Dr. Hund's YouTube page: http://www.youtube.com/playlist?list=PLOBpaEe_y0mYj2pHI2fyiXpCGo5RiKLBa.

2.5 Data Collection

Toward the end of each semester, the focus group facilitator (who was not involved in the course instruction or evaluation) gained consent from students to complete a quantitative survey and invited students to participate in a focus group. After each course was completed and grades were submitted, the students were sent the link to an online quantitative survey. The survey was administered through a web-based survey data collection program. The survey was open for one month, with weekly reminders sent to students. Using a five-point Likert scale, the survey assessed the convenience, learning experience, and overall preferences regarding the video instruction. The Likert scale scores for each statement were: 1 - strongly disagree, 2 - somewhat disagree, 3 - neutral, 4 - somewhat agree, 5 - strongly agree.

Focus groups were conducted to explore the rationale behind student usage and perceptions of the videos. The facilitator led the one-hour focus groups based on a semi-structured guide developed by the authors. The focus groups were capped at seven participants to maximize student discussion; all students were invited to participate but signed up for the groups by responding privately to the invitation. Students received a $10 gift card incentive for survey completion and a $15 gift card incentive for focus group participation, disbursed after completion of the study activity. All research methods were approved by UNM's Institutional Review Board.

2.6 Data Analysis

We present descriptive statistics from the surveys, providing separate results for each course. For each statement on the survey, we reverse code each item such that 'agree' corresponds to agreeing that the intervention was beneficial. We present the number and percentage of responses for each of the five Likert scale categories. Additionally, for each statement, we calculate the percentage of students who agreed that the intervention was beneficial. We define agree as somewhat or strongly agree.

To evaluate whether students agreed that the intervention was beneficial survey, we use a seven out of eight decision rule. Specifically, we state that students generally 'agreed' that the intervention was beneficial for a specific statement if at least seven out of eight students somewhat or strongly agreed that the intervention was beneficial. When fewer than seven out of eight students agreed or disagreed with a statement, we say that results are discordant. We do not conduct any formal hypothesis tests due to the small pilot nature

of the study and large number of questions that result in limited power and multiple testing problems.

There is only one missing observation for one question in the survey data (all other questions have complete data); we use mean imputation to impute a value for this single observation. All data are analyzed using Stata v13 (StataCorp 2013).

We triangulate the quantitative survey data with the qualitative focus group data. The focus groups were digitally recorded, transcribed, and verified for accuracy. The qualitative analysis follows principles of grounded theory (Strauss and Corbin 1990). Transcripts have been independently reviewed by both investigators, who jointly have reviewed emergent themes. These themes are then compared with the survey results.

3. Results

The BIO1 course consisted of 13 students, with nine MPH students and four students from either the College of Pharmacy or non-degree students. The BIO2 course consisted of ten students, with seven MPH students and three College of Pharmacy or non-degree students. Of the ten students in BIO2, six students were also enrolled in BIO1. Therefore, the target population for the study consisted of 17 unique students. In BIO1, eight students completed the survey and seven students participated in the focus group. In BIO2, eight students completed the survey and five students participated in the focus group. There was overlap between students participating in the study between BIO1 and BIO2. Specifically, five students completed the quantitative survey in both BIO1 and BIO2 (resulting in 11 unique students responding); and two students participated in the focus group in both BIO1 and BIO2 (resulting in 10 unique focus group participants). Demographics for the quantitative survey respondents in BIO1 and BIO2 are presented in Table 1. Most respondents were females who enrolled in the course because it was a program requirement but who expressed some interest in the subject matter. The majority of the students spent between three and nine hours per week on the course outside of class.

Across the two courses, there were 42 videos distributed to the students, with 20 videos in BIO1 and 25 videos in BIO2 (three videos from BIO1 were also distributed in BIO2). Excluding the six previously filmed EdX tutorials (for which we do not have view statistics for the students), the average number of YouTube views per video was 9.1, with standard deviation 4.4 and range 3 to 21. After learning the Camtasia program, producing the videos (planning, filming, editing, and uploading) took on average five minutes of production time per one minute of final video time.

In BIO1, videos were between 2 and 15 minutes long and spanned several concepts following a central theme. Student feedback from the BIO1 focus group suggested a preference for shorter videos. In BIO2, videos were shortened, ranging between one and three minutes

Table 1: Demographics for students who completed quantitative survey by course.

Variable	BIO1 (n=8) %	BIO1 (n=8) N	BIO2 (n=8) %	BIO2 (n=8) N
Gender				
Male	13	1	25	2
Female	88	7	75	6
Required to take course for program				
Yes	88	7	100	8
No	13	1	0	0
Time spent on course per week				
0-3 hours	0	0	0	0
3-6 hours	25	2	75	6
6-9 hours	63	5	25	2
9-12 hours	13	1	0	0
12+ hours	0	0	0	0
Interested in subject matter				
Strongly agree	50	4	63	5
Somewhat agree	50	4	38	3
Neutral	0	0	0	0
Somewhat disagree	0	0	0	0
Strongly disagree	0	0	0	0

long and covering only a single concept. Survey results regarding general preferences for the video tutorials are presented in Table 2, stratified by course. The questions in Table 2 are numbered and referenced by these numbers in the text.

Overall, the videos were well-received among the students (Q1,2). In both courses, students agreed that the videos offered advantages (Q1) (BIO1 88%; BIO2 88%). In both courses, students agreed that they would recommend use of the online tutorials in other classes (Q2) (BIO1 88%; BIO2 88%).

Additionally, students seemed to value both in-class lab time and out-of-class video tutorials (Q3,4,5). Students did not agree that they would have preferred a class with all video tutorials (Q3) (BIO1 0%; BIO2 13%). Students in BIO2 agreed that they would not have preferred a class with all in-class tutorials, whereas BIO1 student responses were discordant (Q4) (BIO1 63%; BIO2 88%). The students did not agree that the video tutorials were more enjoyable than in-class labs (Q5) (BIO1 0%; BIO2 25%).

Two prominent themes were observed throughout the course of the study: the usability of the videos and deeper learning facilitated by the videos. In the following sections, the results of the surveys and the focus groups are presented by theme. For each theme, the quantitative survey data are generally summarized first and the qualitative data second.

Table 2: Quantitative survey results regarding overall opinions. Percentages (counts) are displayed for each response category.

Question	Course	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
1. Videos offer advantages	1	0 (0)	13 (1)	0 (0)	25 (2)	63 (5)
	2	0 (0)	13 (1)	0 (0)	0 (0)	88 (7)
2. Recommend use of online tutorials in other classes	1	0 (0)	0 (0)	13 (1)	25 (2)	63 (5)
	2	0 (0)	13 (1)	0 (0)	13 (1)	75 (6)
3. Would have preferred all online labs	1	88 (7)	13 (1)	0 (0)	0 (0)	0 (0)
	2	50 (4)	38 (3)	0 (0)	13 (1)	0 (0)
4. Would not have preferred all in-class labs	1	0 (0)	25 (2)	13 (1)	25 (2)	38 (3)
	2	0 (0)	13 (1)	0 (0)	38 (3)	50 (4)
5. Enjoyed on-line tutorials more than in-class labs	1	25 (2)	13 (1)	63 (5)	0 (0)	0 (0)
	2	13 (1)	25 (2)	38 (3)	13 (1)	13 (1)

3.1 Theme 1: Usability

The first theme that emerged pertained to the usability and convenience of the videos. Reported use of the videos was high in the survey. In BIO1, seven out of eight students reported usually or always viewing the videos; and in BIO2, all eight respondents reported usually or always viewing the videos. Results from the quantitative survey regarding usability of the videos are shown in Table 3. The questions in Table 3 are numbered and referenced by these numbers in the text.

Overall, the students perceived the videos as useful for improving their performance in the course (Q6,7,8). Specifically, students agreed that the videos were perceived as a useful tool for completing homework assignments (Q6) (BIO1 100%; BIO2 88%) and that the videos were a useful tool for exam preparation (Q7) (BIO1 88%; BIO2 88%). Students in both courses agreed that their grades were not negatively impacted by the videos (Q8) (BIO1 100%; BIO2 88%).

Students did not seem to have much difficulty using the videos (Q9, 10) and found the videos convenient with their schedules (Q11, 12). Students agreed regarding not having technical difficulties using the videos (Q9) (BIO1 88%; BIO2 100%). BIO2 students agreed that they were not frustrated by the inability to ask questions to the instructor while watching the videos, while BIO1 student responses were discordant (Q10) (BIO1 75%; BIO2 100%). Students agreed that the videos worked well with their schedules (Q11) (BIO1 100%; BIO2 88%); and students did not agree that it was easier to watch the videos than attend in-class labs (Q12) (BIO1 25%; BIO2 13%).

Regarding video length, students in BIO2 agreed that the videos were not too long, while BIO1 student responses were discordant (Q13) (75%; BIO2 88%); in both courses, student responses were discordant regarding whether they agreed that the videos were not too short (Q14) (BIO1 25%; BIO2 50%). In the focus groups, students stated a preference for shorter

videos that cover only one concept; longer videos were deemed 'overwhelming.'

The survey results also suggest that the usefulness of the videos extends beyond the biostatistics classroom (Q15). Specifically, in BIO2, students agreed that they would use the videos for future course projects or in their jobs (Q15) (BIO1 75%; BIO2 88%).

Table 3: Quantitative survey results regarding usability and learning. Percentages (counts) are displayed for each response category.

Question	Course	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
Usability						
6. Like videos for homework completion	1	0 (0)	0 (0)	0 (0)	13 (1)	88 (7)
	2	0 (0)	13 (1)	0 (0)	13 (1)	75 (6)
7. Liked videos for exam preparation	1	13 (1)	0 (0)	0 (0)	13 (1)	75 (6)
	2	0 (0)	13 (1)	0 (0)	13 (1)	75 (6)
8. Grades were not negatively affected by videos	1	0 (0)	0 (0)	0 (0)	13 (1)	88 (7)
	2	0 (0)	13 (1)	0 (0)	0 (0)	88 (7)
9. No technical difficulties trying to view videos	1	0 (0)	0 (0)	13 (1)	38 (3)	50 (4)
	2	0 (0)	0 (0)	0 (0)	25 (2)	75 (6)
10. Not frustrated by inability to ask questions	1	13 (1)	0 (0)	13 (1)	38 (3)	38 (3)
	2	0 (0)	0 (0)	0 (0)	25 (2)	75 (6)
11. Videos worked well with my schedule	1	0 (0)	0 (0)	0 (0)	38 (3)	63 (5)
	2	0 (0)	0 (0)	13 (1)	13 (1)	75 (6)
12. Easier to complete videos than attend class	1	13 (1)	25 (2)	38 (3)	25 (2)	0 (0)
	2	0 (0)	38 (3)	50 (4)	13 (1)	0 (0)
13. The videos were not too long	1	0 (0)	0 (0)	25 (2)	38 (3)	38 (3)
	2	0 (0)	0 (0)	13 (1)	50 (4)	38 (3)
14. The videos were not too short	1	0 (0)	13 (1)	63 (5)	25 (2)	0 (0)
	2	0 (0)	13 (1)	38 (3)	38 (3)	13 (1)
15. Will use videos in the future	1	0 (0)	0 (0)	25 (2)	13 (1)	63 (5)
	2	0 (0)	13 (1)	0 (0)	25 (2)	63 (5)
Learning						
16. Learn same amount with videos vs. in-class labs	1	13 (1)	63 (5)	0 (0)	13 (1)	13 (1)
	2	0 (0)	75 (6)	0 (0)	25 (2)	0 (0)
17. Understand material better using videos vs. labs	1	0 (0)	50 (4)	38 (3)	0 (0)	13 (1)
	2	0 (0)	50 (4)	25 (2)	13 (1)	13 (1)
18. Did not learn better through in-class instruction	1	13 (1)	38 (3)	25 (2)	25 (2)	0 (0)
	2	0 (0)	75 (6)	13 (1)	13 (1)	0 (0)
19. Confident to complete videos without instructor	1	13 (1)	0 (0)	13 (1)	63 (5)	13 (1)
	2	0 (0)	0 (0)	0 (0)	50 (4)	50 (4)
20. Better able to manage my time with videos	1	0 (0)	38 (3)	50 (4)	13 (1)	0 (0)
	2	0 (0)	38 (3)	25 (2)	25 (2)	13 (1)
21. Not more frustrated watching videos than in lab	1	0 (0)	38 (3)	0 (0)	38 (3)	25 (2)
	2	0 (0)	0 (0)	25 (2)	38 (3)	38 (3)

The qualitative data provided many insights into how the videos were used. Regarding homework and exam preparation, students described specific ways in which the videos were used to complete assignments and study. Videos were typically viewed on an individual basis at home on personal laptop computers. Students highlighted using the videos

for reinforcement of concepts. For instance, one student stated, "We'll go over something in class and then when you're looking at the homework, you'll need like a little reminder of what exactly she did." Another noted, "I'd have the YouTube open on one side and my homework [on the other] just practicing the commands because sometimes there's lots of steps." Hence, the videos seemed to reduce the burden of remembering the multi-step detailed procedures required for statistical computing. Students perceived the videos as an 'added bonus' to the class, and the availability of the videos on weekends and evenings appeared to enhance convenience. For instance, one student stated, "That's why the videos are so helpful because most of the time I don't have the opportunity to start the homework until the weekend" and another felt that, "It's nice to have somewhere I can go to find things 24 hours a day." One student noted that the videos served as 'mobile office hours.'

Some students requested a downloadable format for the videos whereas many other students preferred YouTube because the videos are accessible anywhere with internet access. For example, one student mentioned, "It's just so helpful because I don't know where I'm gonna be between work and school, but at least I have an iPad that I can log on or a laptop and can spend half an hour just going over four videos and feel like I've done something." Another student noted that, "A benefit of them being on YouTube is that if later, after I've taken this class, if I'm working on a research project or something, I could go back and look at that video. So I know I'd be able to access it again in the future and in conjunction with my notes I could probably figure out what I needed to do."

3.2 Theme 2: Deeper Learning

Students seemed to perceive the videos as a tool for enhancing learning and as a supplement to in-class time. Results of the quantitative survey summarizing learning through the videos are shown in Table 3.

Students did not view the videos as superior to the in-class labs and seemed to strongly value in-class instruction (Q16,17,18). Students did not generally agree that they learned the same amount with the videos as in the in-class labs (Q16) (BIO1 25%; BIO2 25%), nor did they agree that they understood the material better using videos compared to the in class labs (Q17) (BIO1 13%; BIO2 25%). Students did not agree that they learned better using videos compared to in-class instruction (Q18) (BIO1 25%; BIO2 13%).

Regarding self-efficacy and independent learning (Q19, 20, 21), BIO2 students agreed that they were confident in their ability to use the videos without the instructor present, whereas BIO1 student responses were discordant (Q19) (BIO1 75%; BIO2 100%). Students did not agree that their time management improved with the videos (Q20) (BIO1 13%; BIO2 38%). Student responses in both courses were discordant regarding whether they agreed that frustration was not higher watching the videos as compared to during in-class lab exercises (Q21) (BIO1 63%; BIO2 75%).

In the focus groups, students suggested that the self-paced nature of the videos was the major contributor to learning. One student noted that, "It allows you to do it at your pace because you do have an idea of the correct way to do it and now you can take it back, slow it down, and really try and absorb it instead of just typing in things." Another student elaborated, "It's like you'll do a step and then you'll hit pause and then you'll finish that step and then you'll do the next step, then hit pause, and keep going." Additionally, a student suggested that repeating the videos acted as a 'reinforcement of learning' and further commented, "Being able to go back and look at the videos again gives us another opportunity to really process the information that we learned. Being able to go back and work that process helps to foster deeper learning."

Reduced anxiety over missing class or missing concepts also helped facilitate learning. Students cited trouble attending office hours due to busy schedules, but shared that, "Having the videos on YouTube has made me less anxious, too, because you're not stressed out about missing anything... I'm a visual learner, so being able to reinforce that by actively reviewing has helped me to learn." One student particularly noted the busy nature of students in the program and how the videos worked within this environment, stating, "In this program we have a lot of people who are working... So if you have to miss class, sometimes there's not time to catch up before the homework is due. So it's been really helpful to have the videos because those kind of give you a bit of backup so you still have the opportunity to learn it without feeling like you're really falling behind."

Students emphasized that the videos were not viewed as a replacement for in-class material but that they value in-class time for less perfunctory activities. One student noted, "We can't trade the online tutorials for something else because the in-class time and the time in the computer lab were both extremely important." A general theme from the focus groups was a strong demand for as much material as possible, i.e., more videos of varying content, more practice exercises (in and out of class), and more readings.

4. Discussion

In summary, using short video tutorials to teach statistical computing concepts was a positively perceived teaching tool by students in two Master's -level biostatistics courses. These short video tutorials were implemented in the context of teaching computing techniques within a small resource-limited program with a non-traditional student body. Students did not report difficulty using the videos and seemed to perceive the videos as useful for improving their learning as well as their course performance. Students also seemed to prefer shorter videos that focused on one concept. This finding was consistent with a recent study of video watching preferences from MOOCs that found students prefer shorter videos and tutorial videos that are easy to rewatch and skim (Guo et al. 2014).

The students valued in-class labs and did not view the videos as a replacement for, but rather as a supplement to, in-class instruction time. Using a hybrid course format has the potential to create a more sustainable and effective learning environment for both students and the instructor, but has not been previously studied in this context. Hybrid courses offer a middle ground in online education, mixing in-class and online components (Young 2002). In a qualitative study of hybrid courses, Kaleta et al. (2007) conclude, "Faculty, students, and even institutions, like hybrid courses. The benefits of improving student learning, providing time flexibility for students and instructors, and offering scheduling and classroom space flexibility for institutions are compelling" (Kaleta et al. 2007, p. 139).

In our pilot study, the ability to use the videos in a self-paced and repetitive manner was consistently cited as a major advantage by the students. The fixed-pace nature of traditional lecturing is disadvantageous for students who learn at slower paces or who periodically cannot attend class; online courses allow students to learn at their own pace (Abdolell and Payne 2010). The role of the professor in the age of online education is constantly changing, leading many to question the need for traditional lecturers (Young 1997).

Relatedly, in the BIO2 focus group, results suggested an unexpected theme that the videos promoted social support among classmates. Students tended to watch the videos on an individual basis, but referenced and recommended specific videos in group-correspondence with classmates. For example, one student noted, "I think it enables us to help each other... I think that it enables peer support." The videos supported group cohesion among classmates. One student noted, "We definitely utilize each other. You do your homework yourself, you figure it out, you learn the commands, and then when you get help if someone's like, 'That looks way wrong,' you can watch it again." By enhancing social support among peers, the videos were a useful instrument in deconstructing the classroom and moving away from traditional lecture-centered models of teaching. Our findings support the notion that hybrid courses have the potential to revolutionize the classroom by changing previously lecturer-centered classrooms to learner-centered environments (Kaleta et al. 2007).

The videos were composed specifically for the BIO1 and BIO2 courses but will also serve as a semi-permanent resource for the PHP and, more broadly, the School of Medicine. While statistical software programs are updated periodically, most programs are backward compatible and thus the instructional exercises in the videos should be recyclable for many years (hence the 'semi-permanent' nature of the videos). At UNM, data analyses are regularly conducted by public health students completing Masters' theses, by medical students who are required to conduct a self-guided research project, and by summer interns affiliated with the Health Disparities Center. This collection of instructional data analysis videos will be made available to these students as a learning tool.

The study has several limitations. First, the study should be interpreted as a pilot study generating preliminary data. The sample size for the study was small with substantial par-

ticipant overlap between the courses; further, the study occurred at a single institution with a single instructor. Future work is needed to explore perceptions of these short video tutorials at other universities and with larger samples to improve the generalizability of the results. The results of this study should be viewed as a proof of concept and a jumping point for further hybrid biostatistics education research in the context of smaller graduate public health settings. Additionally, the study examined only student perceptions of the interventions and did not include a grade-based evaluative component. Therefore, while we can conclude that the intervention was positively perceived among respondents, we cannot conclude that the videos actually improved student learning outcomes. The main limitation regarding implementation of the short video tutorials was the time investment required to make the videos. The instructor must first learn to use the Camtasia program; then, substantial blocks of time must be set aside to design, film, and edit the videos.

In future work, we hope to extend the intervention to include additional elements requested by students. Particularly, students were interested in having access to online practice quizzes and videos covering conceptual material, rather than just computing. We also plan to explore using videos from existing sources, such as the Stata Corporation, rather than making the videos from scratch. Using existing videos has substantial time-savings advantages for the instructor, but reduces professor-student interaction and prevents tailoring the videos to the specific course. Lastly, evaluating the use of short video tutorials in other student populations, such as undergraduate settings and larger schools of public health, is of interest.

Acknowledgments

The authors were funded through an internal education grant from the University of New Mexico School of Medicine's Teacher and Educational Development Program.

REFERENCES

Abdolell, M. and Payne, J. I. (2010), "Developing Research Literacy in Academic Medical Research Institutions: Introducing an Online Modular Course in Biostatistics and Epidemiology," in *Data and context in statistics education: Towards an evidence-based society. Proceedings of the Eighth International Conference on Teaching Statistics*, Ljubljana, Slovenia.

Abrami, P. C. and Bernard, R. M. (2006), "Research on Distance Education: In Defense of Field Experiments," *Distance Education*, 27, 5–26.

Carlisle, M. C. (2010), "Using YouTube to Enhance Student Class Preparation in an Introductory Java Course," in *Proceedings of the 41st Association for Computing Machinery*

Technical Symposium on Computer Science Education, Association for Computing Machinery, pp. 470–474.

DeVaney, T. A. (2009), "Impact of Video Tutorials in an Online Educational Statistics Course," *Journal of Online Learning and Teaching*, 5, 600–608.

—— (2010), "Anxiety and Attitude of Graduate Students in On-campus vs. Online Statistics Courses," *Journal of Statistics Education*, 18.

Enders, F. B. and Diener-West, M. (2006), "Methods of Learning in Statistical Education: A Randomiized Trial of Public Health Graduate Students," *Statistics Education Research Journal*, 5, 5–19.

Evans, S. R., Wang, R., Yeh, T.-M., Anderson, J., Haija, R., McBratney-Owen, P. M., Peeples, L., Sinha, S., Xanthakis, V., Rajicic, N., et al. (2007), "Evaluation of Distance Learning in an Introduction to Biostatistics Class: A Case Study," *Statistics Education Research Journal*, 6, 59–77.

Fineberg, H. V., Green, G. M., Ware, J. H., and Anderson, B. L. (1994), "Changing public health training needs: professional education and the paradigm of public health," *Annual Review of Public Health*, 15, 237–257.

Guo, P. J., Kim, J., and Rubin, R. (2014), "How Video Production Affects Student Engagement: An Empirical Study of MOOC Videos," in *Proceedings of the First Association for Computing Machinery Conference on Learning@ Scale*, pp. 41–50.

Kaleta, R., Skibba, K., and Joosten, T. (2007), "Discovering, Designing, and Delivering Hybrid Courses," *Blended Learning: Research Perspectives*, 111–143.

Larreamendy-Joerns, J., Leinhardt, G., and Corredor, J. (2005), "Six Online Statistics Courses: Examination and Review," *The American Statistician*, 59, 240–251.

McGready, J. and Brookmeyer, R. (2013), "Evaluation of Student Outcomes in Online vs. Campus Biostatistics Education in a Graduate School of Public Health," *Preventive Medicine*, 56, 142–144.

McLaren, C. H. (2004), "A Comparison of Student Persistence and Performance in Online and Classroom Business Statistics Experiences," *Decision Sciences Journal of Innovative Education*, 2, 1–10.

Russell, T. L. (1999), "No Significant Difference Phenomenon," *Educational Technology & Society*, 2, 3.

StataCorp (2013), "Stata Statistical Software: Release 13," .

Strauss, A. and Corbin, J. M. (1990), *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*, Thousand Oaks, CA: Sage Publications, Inc.

Summers, J. J., Waigandt, A., and Whittaker, T. A. (2005), "A Comparison of Student Achievement and Satisfaction in an Online versus a Traditional Face-to-face Statistics Class," *Innovative Higher Education*, 29, 233–250.

Tudor, G. (2006), "Teaching Introductory Statistics Online–Satisfying the Students," *Journal of Statistics Education*, 14.

Utts, J., Sommer, B., Acredolo, C., Maher, M. W., and Matthews, H. R. (2003), "A Study Comparing Traditional and Hybrid Internet-based Instruction in Introductory Statistics Classes," *Journal of Statistics Education*, 11.

Ward, B. (2004), "The Best of Both Worlds: A Hybrid Statistics Course," *Journal of Statistics Education*, 12.

Yablon, Y. B. and Katz, Y. J. (2001), "Statistics through the Medium of the Internet: What Students Think and Achieve," *Academic Exchange Quarterly*, 5, 17–22.

Young, J. R. (1997), "Rethinking the Role of the Professor in an Age of High-Tech Tools." *Chronicle of Higher Education*, 44.

—— (2002), "" Hybrid" Teaching Seeks To End the Divide Between Traditional and Online Instruction." *Chronicle of Higher Education*, 48.

Lauren Hund
Department of Family and Community Medicine
University of New Mexico
1 University of New Mexico, MSC 09 5040
Albuquerque, NM 87131
Email: lbhund@gmail.com
Phone: (505)272-4402

Christina Getrich
Department of Anthropology
University of Maryland
1111 Woods Hall
College Park, MD 20742
Email: cgetrich@umd.edu

Volume 23 (2015) | Archive | Index | Data Archive | Resources | Editorial Board |
Guidelines for Authors | Guidelines for Data Contributors | Guidelines for Readers/Data Users |
Home Page |
Contact JSE | ASA Publications|