

Using Video Creation to Engage Students in Research Methods and Statistics

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Abstract

Engaging students in research methods and statistics courses can be challenging due to the difficulty of the course material. Instructors have developed creative ways to engage students in research methods and statistics courses through active learning assignments (Lewandowski, 2003; Lomax & Moosavi, 2003; Mvudud & Kanyongo, 2011). The purpose of the current studies was to examine the use of video creation to engage students in learning statistics and research methods concepts. In the pilot study, students received extra credit for video creation. In the main study, a rubric was used to assess creativity, group participation, and knowledge. Students in both studies completed a survey assessing their experiences with the project. The video project grades and the final course grades were significantly, positively related in the main study. However, the project grades were not related to final exam grades. Additionally, students reported satisfaction with the projects they created and the majority reported that they would recommend this project for future courses.

Keywords: statistics, research methods, video creation

Engaging students in research methods and statistics courses can be challenging due to the difficulty of the course material. Many psychology majors enter the class with negative expectations and may wonder why these courses are required in psychology. Instructors of these courses may not be excited about teaching these courses either. Instructors' reluctance to teaching statistics and research may be due to their perceptions that students lack ability or interest in statistics. Additionally, students' own perceptions of their inability to understand statistics and their lack of understanding of the utility of research may contribute to their negative expectations of these courses (Elliott, Choi, & Friedlitie, 2013). It is important to understand the underlying causes of these negative reactions toward statistics because both aptitude and motivation are predictive of achievement in statistics (Tremblay, Gardner, & Heipel, 2000). Because many students are reluctant to participate in the process of learning statistics and research methods, it is important that instructors engage students in the learning process.

Active learning, in comparison to passive learning, occurs when students take a "dynamic and energetic role" in their own education (Petress, 2008, p. 566). Research has shown that active learning is an effective approach to teaching statistics (Ryan, 2006; Tintle, Topliff, VanderStoep, Holmes, & Swanson, 2012). Thus, instructors of research methods and statistics have found creative ways to teach course concepts. For example, Lewandowski (2003) developed an interesting active learning assignment to teach internal validity by using smarties and dum-dums. In this assignment, students participate in a poorly designed study and then have opportunities to discuss threats to internal validity in this study. Flora, Bromley, and Bracken (2012) also recognized the importance of using active learning techniques in research methods and statistics. They developed an assignment that examines the scientific method using the popular television series, *Mythbusters*. Using humor (Lomax & Moosavi, 2003) and using real life examples to teach statistical concepts (Mvududu & Kanyongo, 2011) were related to student engagement. Interestingly, even obituaries have been used to examine statistical concepts like outliers, missing data, and hypothesis testing (Levonian, 2001).

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Previous studies have examined the use of videos as a teaching tool (Anderson, 1992; Boyatzis, 1994; Christopher, Walter, Marek, & Koenig, 2004; Dorris & Ducey, 1978; Fleming, Piedmont, & Hiam, 1990). A variety of films including documentaries and full-length feature films have been used to teach concepts in many areas of psychology including but not limited to social psychology, developmental psychology, introductory psychology, and abnormal psychology. Videos have also been used as a teaching tool in statistics and research methods courses. For example, Moore (1993) discussed the value of using television programs to teach statistical concepts. Additionally, Hartnett (2013) described a research design assignment in which students created three research designs to test a hypothesis associated with the documentary found on Netflix. Realizing the importance of effective use of videos in the classroom, Cleveland (2011) developed a guide to the appropriate use of YouTube that emphasized the importance of choosing videos that were relevant to course material rather than just humorous. She also explained that these videos should enhance, not replace, the lecture.

Use of videos as a teaching tool often involves the instructor showing a video or video clip in class and linking that video to a class assignment or discussion. However, students can also benefit from creating their own videos to demonstrate psychological concepts. For example, Marsh (2011) asked students in a personality course to create videos demonstrating application of the course material. Students worked in small groups and the projects were used for future classes and were included in the students' e-portfolios. Pettijohn and Perelli (2005) found that video creation projects were related to higher scores on multiple choice questions related to the projects in an introductory psychology course. Students reported that they enjoyed the projects and had learned more about psychology as a result of the video projects.

The purpose of the current study was to examine the use of video creation to engage students in learning statistics and research methods concepts. In the pilot study, students completed the project on a volunteer basis for extra credit while in the main study students were required to complete the project for a grade in the course. For the pilot study, it was predicted that students would enjoy the video creation process and that they would recommend this project to future research methods/statistics courses.

Pilot Study Method

At the participating university, the research methods courses are taught in a two semester sequence that includes statistics and methods in both courses. In Research Methods I, students are exposed to descriptive statistics and non-experimental designs. In Research Methods II, students are exposed to inferential statistics and experimental designs. Students in the Research Methods II course participated in the pilot study in spring 2011. There were five teams for a total of 16 students who participated in the pilot study for extra credit. The projects resulted in two rap videos, one detective video, one skit, and one animated video. Topics covered included: hypothesis testing, ANOVA, t-tests, and measures of central tendency.

Pilot Study Results

Six students responded to a brief survey assessing their experiences with this project (Appendix A). This survey was sent via email through an online Qualtrics link. The sample was likely small because the link was sent out after the end of the course and the instructor was unable to talk to the students about the survey in class. Students responded to five open-ended questions that asked about experiences with the project and courses including reasons for choosing to do the project, topics chosen for the project, steps in completing the project, what was learned from the project, and the most challenging aspect of the course. Students also indicated level of satisfaction with the project and indicated whether or not they would recommend this project to future students. Satisfaction was measured on a 7-point Likert scale. The mean score for satisfaction was 6.11 ($SD = 1.27$).

All six students who responded to the survey indicated that they used class notes to prepare for creation of the videos. They also all agreed that they would recommend this project for a future class. Students were also asked what they learned from the project. Sample responses included, "this project prepared me for the final exam", "statistics really aren't that bad", and "coming up with a creative way to present the information was actually like studying because in order to create the song we had to know the information to add to it." Finally, students were asked about the most challenging aspect of the research methods course. Sample responses included, "the math!", "Making sure you didn't make a mistake. It's math so if you mess up a little then the whole thing gets messed up", and "The most challenging aspect of the research methods course was remembering the formulas."

Based on the results of the pilot study, students seemed to enjoy the assignment and were able to use this assignment to prepare for the final exam. However, it should be noted that the sample completing the survey was small ($n = 6$) so it is difficult to truly assess the success of this project from the pilot study results alone. Thus, a second study was launched in the spring 2013 semester.

Main Study

Based on the results of the pilot study, this video creation assignment was modified for the 2012-2013 academic year. This assignment was included as a graded assignment in Research Methods II rather than an extra credit opportunity as in the pilot study. As previously mentioned, Research Methods I includes descriptive statistics and non-experimental designs while Research Methods II includes inferential statistics and experimental designs. In the main study, students were given choices regarding topics and formed groups of approximately four to five students. Students' experiences were assessed upon completion of the project (Appendix A). Additionally, a rubric was used to assess student knowledge of concepts, group participation, and creativity (Appendix B). It was predicted that students would be satisfied with the video creation projects and would recommend these projects to future classes. Additionally, it was predicted that students would indicate that this project was helpful as they prepared for the final exam. Because the video projects were due one week before the final exam, it was also predicted that the video creation grades would be positively correlated to the final exam grades.

Method

Participants

Participants included 42 students (8 men and 34 women) enrolled in one of two sections of the PSY 305-Research Methods II course. Group sizes varied from two students to five students while two students completed the projects on their own. There were 14 completed projects submitted to the instructor. The majority of the students were either sophomores ($n = 20$) or juniors ($n = 16$) while there were five seniors and one freshman.

Procedure

On the first day of class, students received the following information from the course syllabus:

Video Creation Assignment. Students will create music videos based on topics in statistics. Student will be given choices regarding topics and will form groups of approximately four students. Students' experiences will be assessed upon completion of the project. Additionally, a rubric will be used to assess student learning. Students may use flip cameras that are available through media services. Sample videos from previous classes will be available. This assignment is worth 40 points and is **due on April 2, 2013**.

During the semester, students were shown sample videos from the pilot study as well as samples from YouTube© that could be used as a guide. Students formed their own groups and were asked to submit possible topics to the instructor for approval. The instructor also provided possible topics to the students. Students were given information on how to obtain flip cameras from media services on campus as well. Some students indicated concern with creating musical videos so these students were allowed to develop other creative video projects instead.

Upon submission of the projects, the instructor used the rubric for grading. Students were also asked to rate each group member's contributions using a group member rating form. On this form, students were able to report on their own responsibilities as well as the responsibilities of each group member. They were also asked to assign a grade for the project for themselves and each group member. This information was used to complete the group member aspect of the rubric. The two students who worked alone of the project did not receive any credit for the group aspect of the rubric. Within one week of completing the projects, students were sent the survey link so that they could provide feedback regarding experiences with the project.

Results

The topics selected for the projects included ethics, t-tests, ANOVA, steps to hypothesis testing, measures of central tendency, validity, and dependent t-tests. Four of the groups covered several different statistical analyses in their videos. The majority of the videos were music videos but there were also three skits and one poem. The mean grade on the project was a 36 ($SD = 6.45$) out of a total possible score of 40. The lowest grade was 20 while the highest grade was 39 out of 40. Although in the predicted direction, the correlation between the final exam grades and video creation grades was not significant ($r = .23, p = .14$). The mean grade on the final exam was 70.5 ($SD = 14.61$). The lowest grade on the final exam was 37 while the highest grade was 96 out of 100. The video project grades and the final course grades were significantly, positively related ($r = .40, p < .05$). The mean grade in the course was an 80.27 ($SD = 12.01$). The lowest final grade was 46.54 while the highest grade was 99.14 out of 100. The video project grade was removed from the final grade when calculating this correlation to avoid any possible criterion contamination.

Students received the survey link one week after the projects were due. Of the 42 students who completed the project, 20 female and 6 male students completed the online survey. The majority of respondents were sophomores ($n = 16$). Students were asked to respond to how satisfied they were with the final project on a seven

point Likert scale. The mean response was 5.73 ($SD = 1.28$). The majority of the sample (77%) indicated that they would recommend this project in future classes. Students also indicated if the project helped them prepared for the exam. The mean response was 2.69 ($SD = 1.09$) on a five-point Likert scale. Finally, students were asked if the video creation project was a valuable learning tool. The mean response was 3.12 ($SD = 1.11$) on a five-point Likert scale.

Correlations were calculated between three of the subjective measures from the survey and the video project grade and final grades. The subjective measures that were examined include satisfaction with the project, the project was a valuable learning tool, and the video project helped with preparation for the final. None of these variables were significantly related to the video project grade or the final grades in the course. Therefore, these variables were not included in a regression analysis. It should be noted that the number of students who completed the survey was small ($n = 26$) and could have contributed to the non-significant correlations. Only the video project grade was examined as a predictor of final grades minus the project grade. The grades for all participants ($n = 42$) were included in the regression. The model was significant, $F(1, 40) = 7.81, p < .01$. The video project grade accounted for 16% of the variance in final grades minus the project grade and was a significant predictor ($r = .404, t = 2.80, p < .05$).

Students were asked several open-ended questions as well. For example, students were asked how they prepared for the video project. The most common responses was “read through the notes” ($n = 18$). Other responses included, “watched previous YouTube clips”, “We took a song already made and then used our notes to insert lyrics that were related to statistics”, and “We looked for a song and then decided on our focal point.” Students were also asked what they learned from the project. Sample responses included, “It refreshed my memory of T-tests”, “Teamwork, being creative, and basics about Z & T tests”, “to work together, and how to explain what we have learned all semester in a video”, “Refreshed my memory on dependent t tests”, and “to work together, and how to explain what we have learned all semester in a video.” Students also shared any challenges associated with the project. The most common response indicated that time was an issue ($n = 12$). Other challenges included video editing, communication, and coming up with an idea for the project.

The remaining questions on the online survey assessed general experiences with the research methods courses. Student were asked about level of comfort with statistics ($M = 4.23; SD = .91$) and research methods ($M = 4.23; SD = .99$) after taking the course. Students were also asked an open ended question regarding challenges associated with the research methods courses. The most common responses indicated that learning the statistical formulas and when to use each statistical test was the most challenging aspect of the course ($n = 15$). Other responses included, “the research proposal”, “the IRB proposal”, and “the video project.”

Discussion

Overall, the video project seemed to be a successful technique for allowing students to apply course material in a creative way. The results indicated that the video creation project grades were predictive of final grades in the course although the project grades were not significantly related to final exam grades. Additionally, the majority of students who responded to the online survey indicated that they were satisfied with the project and would recommend it for future classes. Several groups posted their videos to YouTube while the remaining videos were submitted to the instructor as MP4 videos. The videos and links have been saved so that each can be shared with future sections of research methods. These videos can be used as teaching tools as well as examples of previous video projects.

Several students expressed concerns regarding scheduling group meetings and times to record the videos. Students were given 45 minutes during one class meeting to meet with their group members. All other meetings took place outside of class. Some students indicated that the project should be due earlier in the term. The project was due one week before the final exam. The reason that the project was due so late in the term was so that students would have been introduced to almost all of the material prior to the due date. In future terms, the due date could be moved a week earlier. Most groups seemed to work well together with few problems although students in one group did receive different grades on the project due to unequal contributions. Also, two students chose to create individual rather than group projects for this assignment. These students did not receive any credit for the group aspect of the rubric.

Although in the predicted direction, the correlation between the video creation project grades and final exam grades was not significant. Upon examining the range of scores, there was more variability in the final exam grades than in the video project grades. This difference makes it difficult to examine the correlation between these two variables. Additionally, the final exam for this course is primarily composed of items asking students to identify the independent variable, dependent variable, and most appropriate statistical test for given research scenarios. For most of the projects, students selected specific statistical tests. Therefore, it would be interesting to determine if students did better on items that focused on the specific test that they included in their video. The video

creation project grades were significantly, positively related to the final course grades. Thus, students who did well on the project also did well in the course. It is likely that students who were doing well in the course throughout the term were more knowledgeable of the material and thus did well on the video projects.

One limitation of this study was that only 26 of the 42 students completed the online survey. Students were reminded three times about the survey. It would have been useful to have information from all of the students who completed the project. In future semesters, the survey should be administered in class rather than online so that the sample size is closer to the actual number who completed the project.

Another limitation of this study is that it was difficult to determine if learning occurred. Because there are several other assignments in this course, it was impossible to isolate the success of this one assignment. Additionally, because this assignment was due at the end of the semester, the final exam was the only aspect of the course that could have been affected by learning from this project. However, the results of the regression analysis indicated that the project grade was predictive of final grades in the course when excluding the project grade from the final grade. A larger sample size is needed to examine the relationship between project grades and final exam grades. In future semesters, it might also be useful to include a more specific measure of learning of the material based on the video project. For example, a pre- and post-test measure could be used. This could pose some difficulties since students chose different topics. However, the instructor could provide specific topics to students and create pre and post measures for each of these topics. The rubric could also be adapted so that there are different versions based on the specific topic that is included in the videos. Finally, because a main goal of this project was to increase learning, an experimental design should be incorporated so that one section of students is assigned the project while the other section does not complete the project. An experimental design would allow examination of a possible causal relationship between the video project assignment and the final exam or final grades in the course.

In conclusion, the projects were creative and most students seemed to enjoy the experience. It should be noted that enjoyment does not equate to learning. However, enjoyment does suggest that students were engaged in the material. Research methods and statistics courses can be challenging so it is important that instructors find ways to bring the material to life for students. Video creation projects seem to be one way to actively engage students in this course material.

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Appendix A

Survey Items Completed Following Project Submission

1. Gender
2. Class Standing
3. When did you take Psy 305- Research Methods II?
4. How many other students did you work with on this statistics/research methods video?
5. Which topics from statistics or research methods did you focus on in your video project?
6. How did you prepare to create the video (e.g., read through notes, etc)?
7. How satisfied were you with the result of the video project?
8. Would you recommend this project to other students taking research methods/statistics?
9. What did you learn from this project?
10. Describe any challenges associated with this project.
11. The video creation assignment helped me prepare for the final exam.
12. The video creation assignment was a valuable learning tool.
13. I feel more comfortable with statistics after taking this course.
14. I feel more comfortable with research methods after taking this course.
15. What was the most challenging aspect of the research methods courses?
16. What grade do you expect to earn in this course?
17. Do you have any other comments?

Note. Items 4, 5, 6, 9, 14, and 16 were open-ended questions.

Appendix B

Rubric Used to Assess Grades for Video Projects

	5093368 Needs Improving 5	5093369 Some Good Details 10	5093370 Very Good 15	5093371 Excellent 20
	Needs Improving 1 2 3	Some Good Details 4 5 6	Very Good 7 8	Excellent 9 10
Creativity Make an interesting video on statistics or research methods 5093372 The ad does not i	Needs Improving Lacks creativity. Shows little imaginative engagement. 5093373 The ad gets the c	Some Good Details Reproduces an example but does not extend on that example. 5093374 The ad uses thre	Very Good Demonstrates creativity 5093375 The ad is great a	Excellent Project is well done and demonstrates creativity in presenting statistical concepts. Connects ideas in a novel way.
Understanding of research methods/statistics concepts. Demonstrate understanding of statistics/methods concepts used in the video. 5093376 No name and doe	Needs Improving Inaccurate information included in video 5093377 Clear product nar	Some Good Details Demonstrates understanding of some, but not all of the concepts included in the video. 5093378 Product name is c	Very Good Demonstrates understanding of most concepts included in the video. 5093379 Product name ve	Excellent Demonstrates excellent understanding of concepts. All information is accurate.
OVERALL DESIGN Use of images and color makes the video memorable. 5093380 Not clear, no colc	Needs Improving No images or words. Does not grab audience's attention. 5093381 Some colour, pict	Some Good Details Some use of color and sound. No moving images. 5093382 Lots of colour, gc	Very Good Good use of pictures and sound. Includes moving images. 5093383 Good colour, pict	Excellent Pictures connected to words of song. Great use of color and moving images
Works cooperatively with group members to achieve goals. 5093384 Poor use of langu	Needs Improving Does not contribute to group project. 5093385 One adjective us	Some Good Details Rarely contributes ideas to the project. 5093386	Very Good Contributes some ideas to the project and works cooperatively with group members.	Excellent Demonstrates leadership in the group. Works well with all members and contributes ideas

Three adjectives	5093387	to project.
	More than three e	