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Using short videos in teaching a social science subject: Values and challenges

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Using short videos in teaching a social science subject: Values and challenges

ABSTRACT

The advent of information technology has made multimedia a useful teaching resource. At the National University of Singapore, educators from fields such as Medicine have regularly used videos to enhance their teaching. However, faculty members from other disciplines may not utilise these resources as often. This study aims to identify the values and challenges of using short videos to supplement traditional pedagogical methods in social science. A pedagogical experiment of using short videos in classroom teaching was introduced for two consecutive academic years, and a survey was done at the end of each semester. Summary statistics and hypothesis testing suggest that using carefully selected and relevant short videos can help to link theoretical knowledge with real-world situations, increase student interests in a subject, and stimulate their critical thinking. However, the implementation of the pedagogy is not without difficulties. Finding relevant and objective videos that are of optimal length is a challenging and time-consuming task. Fortunately, the results of this study show that practice and experience help.

INTRODUCTION

The advent of information technology has made multimedia an important teaching resource both inside and outside classrooms, and the literature has proven its usefulness from several aspects. Educational institutions now often encourage the use of multimedia in teaching, and educators from fields such as Medicine already use videos to enhance teaching on a regular basis, as videos can serve as good visual aids¹. On the other hand, faculty members from certain social science fields use video sources less often, possibly because appropriate short videos for those areas are difficult to

¹ For example, it is now favourable to use videos of endoscopy to show the complete structure of the stomach. Previously, students could only learn this subject from the lecturer's verbal description with one or two pictures. Another example is to use videos to illustrate the procedure of removing abdominal aortic aneurysms. Previously, the procedure was typically illustrated with step-by-step hand-drawing pictures. Using video is superior, as it provides full information of medical procedures and clinical experiences.

find. Nevertheless, the potential benefits of using multimedia exist. Thus, this study aims to identify the values and challenges of using short videos for classroom teaching in social science disciplines.

The benefits of using multimedia in teaching are evident in many ways. For instance, the use of Internet and other online learning platforms have improved students' learning performance (Wolverton & Wolverton, 2003; Yam & Rossini, 2011) while giving them the flexibility of choosing their preferred learning environment (Arbaugh, 2005). Through online platforms, students are able to view lectures at their own pace. This flexibility may allow them to achieve better results and performance. As the lectures are viewed outside the classroom, it is possible to implement the "inverted classroom" (Lage et al., 2000; Gannod et al., 2008) where homework assignments are discussed and done in class. This new classroom format may allow students more opportunities to model their critical thinking while catering to their different learning styles without any compromise on the content coverage by the educator (Lage & Platt, 2000).

The literature attests to the helpfulness of incorporating multimedia inside the classroom as a complement to traditional teaching pedagogy. For example, brief video clips shown in class can add real-life examples that link theoretical knowledge with real-world practices (Krammer et al., 2006). This enables students to pay better attention as the ideas taught can be accentuated (Stone, 1999).

Teachers of Economics find that the potential benefits of using multimedia inside and outside the classroom may also be applicable to this field. For instance, online communication platforms provide more opportunities for the students and instructors to interact. Online learning interfaces, such as macroeconomic simulations and online trading games, are also useful in engaging the students to practice difficult concepts (Agarwal & Day, 1998; Simkins, 1999; Katz & Becker, 1999). Through these learning aids, Economics instructions become more lively. Rhodes and Cervený (1984) argued that inserting videos in classroom teaching of Economics can help to segregate difficult learning tasks into more manageable ones for the students. Although they did not discover any significant positive results empirically, the positive theory motivates further research.

This paper looks at the values and challenges of using short videos to supplement traditional classroom teaching in a social science subject. A whole-semester pedagogical experiment was conducted for a Real Estate

Economics module for two consecutive academic years at the National University of Singapore (NUS). Carefully selected videos that were pertinent to the module were selected for every lecture. Student satisfaction was analysed, and hypothesis testing was performed. The results suggest that short videos can help to link theoretical knowledge with real-world practices, increase student interest in a subject, and stimulate critical thinking. It can also enliven lectures and help students to stay focused. However, even though the literature has provided some useful principles on using video resources in the teaching of Economics (Sexton, 2006; Macy & Terry, 2008), the implementation of the pedagogy is not without difficulties. First, finding relevant and objective videos from the Internet are difficult, and students may have differing views on what objectivity is. Second, there may be non-optimal uses of videos (Hobbs, 2006). Some online videos may be too long for teaching purposes; long and irrelevant videos may be distracting (Canning-Wilson, 2000). Nevertheless, trimming the videos to shorter lengths can also be distracting. Additionally, inappropriate timings of video screening can disrupt students' concentration. Fortunately, with more experience, the problems can be eased and substantial rewards can be achieved.

METHODOLOGY

A pedagogical experiment was introduced during the first semester of academic year 2008/2009 (AY08/09 hereafter) on the Real Estate Economics module, which was taught in a large lecture setting with about 150 sophomores from the Department of Real Estate at NUS. The module focused on the economic analysis of urban and real estate issues. Student feedback suggested that the module was one of the more difficult subjects in the curriculum as it was both theoretical and technical.

During the semester, several short videos were included in each lecture. The videos were obtained from online public domains². Specifically, each lecture topic would have a thought-provoking introductory video to stimulate students' general interests on the subject. For instance, before teaching the economics of traffic congestion and explaining why traffic-congestion tax is a good policy, a video on Los Angeles's highway traffic was shown so that students can have a sense of how bad traffic congestion can be in a world's major city, and a video on Singaporeans complaining about the Electronic Road Pricing was shown in order for the students to connect the lecture topic's relevance with the real world. Second, short explanatory videos

² An example is YouTube.

were used to support the elaboration of sophisticated economic theory and concept. For example, in explaining transportation technologies' influences on urban form, a video on the history of the London Underground was shown to illustrate how the opening of this subway system greatly affected the city's urban structure and the residents' lifestyle in the 19th century. Third, after the introduction of a theory and its related policies, videos on real-world examples or activists' speeches were shown in order for the students to draw the connection between theory and practice. For instance, a video about the Watts Riots in Los Angeles was shown after teaching the economics about racial segregation and explaining why the Singapore government strives for racial harmony. The video allowed the students to see the disastrous consequence of racial tension.

Two significant difficulties were encountered when preparing and delivering the lectures. It was hard to find unbiased videos for certain topics. For instance, most of the online videos about the traffic congestion tax in New York City or in Singapore were rather emotional. Also, when a video was long or less relevant to the subject, some students lost their concentration. Although the skill of choosing videos becomes better with experience, finding good videos is still challenging, especially when the real-world issues involved some politics.

After a semester, the author formed several hypotheses to assess the effectiveness of using short videos in classroom teaching. To test these hypotheses, an email was sent to all enrolled students inviting them to participate in an anonymous online survey at the end of the semester. Participation was voluntary and no incentive was offered. The response rate was 36% or 60 out of 167 students. This is satisfactory. The mean response rate of e-mail and web-based surveys reported in the literature was 36.83% (Sheehan, 2001). Also, the response rates of college student surveys were usually between 25% and 35%³ (Bruce et al., 2006), with a decreasing trend over time (Porter & Whitcomb, 2003).

The participants answered 7 structured questions. They are:

1. The videos were relevant to the subject.
2. Overall, the videos were objective and unbiased.
3. The videos increased my interest in the subject.

³ In NUS, the response rate of an undergraduate Student Feedback Exercise (teaching evaluation) can be as high as 90% as participating students are given extra credits which can be used in bidding for their preferred modules in the next academic year. For graduate students who do not receive such a strong incentive, their response rate is usually around 30%.

4. The videos were effective in making connections between theory and practice.
5. The use of videos did not disrupt my concentration.
6. Overall, the use of videos was effective.
7. Recommend the continued use of video sources in classroom teaching.

The students responded to the survey using a 5-point Likert Scale from ¹ to ⁵: ⁽¹⁾ strongly disagree, ⁽²⁾ somewhat disagree, ⁽³⁾ neutral, ⁽⁴⁾ somewhat agree and ⁽⁵⁾ strongly agree. An additional open-ended question was also included to allow the students to share their opinions in more details.

The experiment was repeated for the next academic year to examine whether the practice and experience improved the effectiveness of using videos. While the course materials were kept almost identical except for updates of current issues, some of the videos were trimmed and the timings for playing the videos were adjusted. For instance, a speech by the Canadian Liberal Party leader on carbon tax was shown during an urban sustainability lecture. Although the talk was informative, some parts of the video were less about economics but more about politics. In my first experiment, it was found that many students were not paying attention to the politics parts. Thus, those parts were trimmed off in the second experiment. This allowed the students to focus on the economic contents without being distracted from time to time. In addition, in my first experiment, I found that some students were not able to concentrate after watching a video. Thus, I reduced the number of videos shown in the middle part of each lecture topic in the second experiment. The survey response rate was 44% translating to 65 out of 148 students. A comparison between the two sets of survey results was made to see if practice and experience improved the effectiveness of using videos⁴.

RESULTS AND DISCUSSION

Parametric and non-parametric tests were both included, as it is arguable how Likert Scale data should be analysed. Rigorously speaking, Likert

⁴ One may wonder whether the differences in ratings of the two cohorts were due to some heterogeneity between the cohorts i.e. students in one cohort were more inclined to give higher ratings than those in the other cohort. Nevertheless, looking at the results of the university's teaching evaluations from the students, there wasn't such a tendency. The percentages of AY08/09 real-estate students who gave lecturers teaching a year 2 module a 1, 2, 3, 4 and 5 overall ratings were 1.0%, 2.3%, 17.1%, 61.5% and 18.2%, respectively; and the percentages of AY09/10 students who gave a 1, 2, 3, 4 and 5 overall ratings were 0.5%, 2.1%, 17.5%, 60.4% and 19.6%, respectively. Both parametric and non-parametric tests cannot reject the hypothesis that the two samples are independent.

Scale data should be treated as ordinal data and non-parametric tests are favourable. Nevertheless, many researchers support the practice of treating Likert Scale data as level data and have argued that the violation of Stevens' criteria does not lead to serious consequences for the outcomes of data analysis (Knapp, 1990; Burns & Grove, 2009). As a result, many works which treat Likert Scale data as level data and perform parametric tests have been well received (e.g., Rindfleisch & Moorman, 2001; Wulf et al., 2001; Hren et al., 2004). Moreover, the teaching-evaluation questions of many education institutions, including NUS and other world renowned universities, are Likert Scale; and these institutes use mean and variance to analyse teaching performance. Since this study's survey was essentially a teaching evaluation, parametric tests are also desirable. In this section, the mean and variance of the survey responses are first analysed, and t-test and analysis of variance are performed. Then, the survey results are alternatively treated as ordinal data, and contingency tables and chi-square statistics are produced. Thus, the readers can focus on the results of their preferred tests. Basically, the parametric and non-parametric tests draw the same conclusions.

Structural questions

In Figure 1, a radar chart gives an overview of the survey results. The datum values on the seven equi-angular spokes represent the average ratings of the seven structural questions. The values labeled by the diamond shape and square are for AY^{08/09} and AY^{09/10} (i.e., the academic year of 2009/2010), respectively. The average ratings of AY^{09/10} show considerable improvements in all 7 aspects compared to the previous year's results, which are already quite positive. The illustration suggests that the pedagogy achieved satisfactory outcomes in general, and practice and experience increased the effectiveness.

Table 1 shows a more detailed analysis. The first part provides summary statistics of the 7 questions. Particularly, the mean value reflects the overall satisfaction with the subject and the variance indicates the level of consensus among the students. The responses were positive in the first year (AY^{08/09}), and those in the second year (AY^{09/10}) showed increased mean ratings. The variances, on the other hand, decreased for all questions, implying a higher consensus of satisfaction among the students.

Making connections between theoretical knowledge with the real-world practices is a significant advantage of including videos in teaching Economics and a relatively "low hanging fruit," as indicated by Question 4's results.

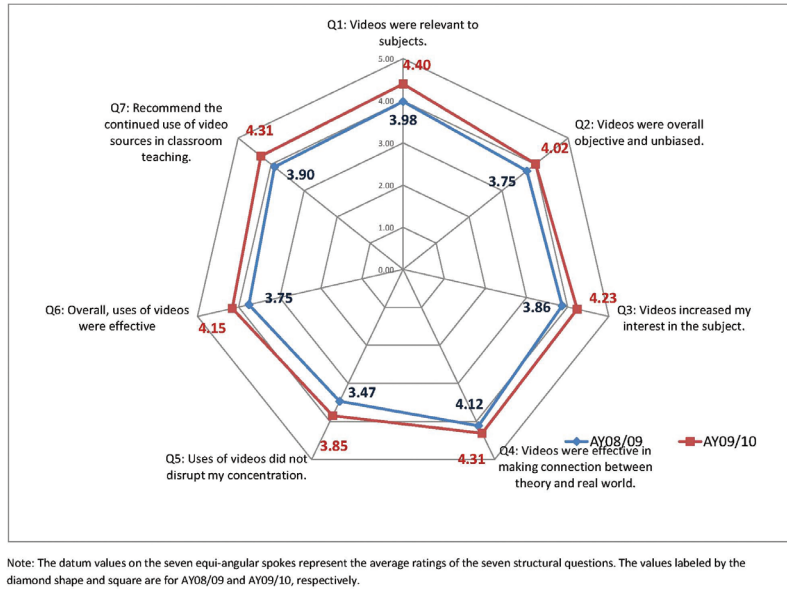


Fig. 1. An overview of the survey results.

Table 1. Summary statistics and hypothesis testing

	Summary statistics			1 st H ₀	2 nd H ₀
	Sample	Mean	Var	F-test	t-test
Q1: The videos were relevant to the subject	AY08/09	3.98	0.73	2.38**	-3.21**
	AY09/10	4.40	0.31		
Q2: The videos were overall objective and unbiased	AY08/09	3.75	0.67	1.09	-1.86*
	AY09/10	4.02	0.61		
Q3: The videos increased my interest in the subject	AY08/09	3.86	0.74	1.20	-2.48**
	AY09/10	4.23	0.62		
Q4: The videos were effective in making connections between theory and real world	AY08/09	4.12	0.44	1.42*	-1.78*
	AY09/10	4.31	0.31		
Q5: The use of videos did not disrupt my concentration	AY08/09	3.47	1.03	1.36	-2.25**
	AY09/10	3.85	0.76		
Q6: Overall, the use of videos was effective	AY08/09	3.75	0.80	1.71**	-2.84**
	AY09/10	4.15	0.44		
Q7: Recommend the continued use of video sources in classroom teaching	AY08/09	3.90	0.87	1.73**	-2.76**
	AY09/10	4.31	0.50		

Note: 1st H₀ (the 1st null hypothesis): the 2 samples of a question have equal variance;
 2nd H₀ (the 2nd null hypothesis): the 2 samples of a question have equal mean;
 ** and * indicate 5% and 10% levels of significance, respectively;
 AY08/09 and AY09/10 denote the academic years of 2008/2009 and 2009/2010, respectively.

The response was particularly good even in the first year when the author had no prior experience in the new pedagogy. The mean rating of ^{4.12} is the highest among all questions and its variance of ^{0.44} is substantially smaller than that of any other question.

However, inserting short videos without disrupting students' concentration seemed to be a challenge, because the mean ratings of Question ⁵ were consistently the lowest among all questions in both years, and the variances were consistently the largest. In AY^{09/10}, it was the only question with a mean rating below ⁴. Similarly, finding objective videos was another challenge.

Two tests were carried out to understand whether the pedagogy was more effectively used in the second year. The first was an F-test examining whether the two samples have equal variances, and the second was a T-test investigating whether the samples have equal means. Moreover, the T-test was assumed to have unequal variances if and only if the F-test rejected equal variances at ^{5%} significance level.

The last two columns of Table ¹ show the results of the tests. For Questions ¹, ⁶ and ⁷, the second sample obtained both a smaller variance and a higher mean at ^{5%} significance level, compared to the first sample. Thus, in the second year, there was a significantly higher rating and consensus on the videos' relevance to the subjects, effectiveness of the pedagogy, and whether the author should continue using videos in the teaching.

For Question ⁴ (making connections between theory and practice), the F-test suggested an insignificant decrease in variance although the T-test indicated a significant increase in the mean. This was not surprising because the variance in the first year was already small. Overall, the above results suggest that practice and experience in selecting and using videos do make the pedagogy more effective.

The results of Questions ³ and ⁵ are intriguing. The mean values of Question ³ indicate that the ability to increase student interests in a subject is an advantage of incorporating videos during lectures, but the mean values of Question ⁵ suggest a caveat in using videos as they could disrupt students' concentration. Can experience further tap the advantage of videos and reduce the possible adverse effect? The T-test indicates significant increases in the mean values for both questions, implying the answer is positive in general. However, the F-test shows insignificant changes in the variances. The lower tails were not shortened in the second year according to the raw data. The fact that the pedagogical experiment did not uniformly benefit all students

deserves educators' attention and also calls for further research on refinement of this teaching methodology.

The selection of unbiased videos seems to be a challenge too, as reflected by the results obtained for Question 2. The F-test accepts equal variance at 5% significance level, and the T-test accepts equal mean. Thus, there was no statistically significant improvement was made in this respect, despite substantial efforts. There are two possible reasons. First, it is really hard to get objective and unbiased videos. Second, the students may have certain subjective or biased perspectives, which make the selection of "good" videos difficult.

The rest of this subsection treats the survey data as ordinal. For each question, Table 2 presents the contingency table and chi-square statistics, where the former allows the derivation of the latter, which indicates whether the two cohorts of students have significant differences in their levels of satisfaction. The results are generally consistent with the previous analysis, although the significance levels are lower. Particularly, for Questions 1, 3, 5 and 6, the chi-square statistics indicate significant differences in satisfaction of the two cohorts, and then the frequency counts in the contingency tables reveal that the second cohort has higher satisfaction in the chosen videos' relevance to the subject and ability to increase the students' interests; the cohort also thinks more highly on the videos' overall effectiveness for learning and has less concern about the disruption the insertion of videos may cause. Overall, practice and experience do improve the use of videos.

Open-ended Question

Compared to the students in AY^{08/09}, those in AY^{09/10} had more compliments and less complaints, as depicted in the open-ended question. Generally, the students' comments are consistent with the previous analysis, but they also reveal other benefits and challenges.

For instance, several students mentioned that using videos "helped to break the monotony of the lectures" and "provided 'breaks' so that the lecture would not be so draining". Also, it gave students "a chance to... reflect or absorb what was just taught". Additionally, "timely videos add interest and prevent the students from being distracted by other things". Nevertheless, the benefits as seen by some students are seen as drawbacks by others. For example, a student stated, "somehow I found the video a little bit distracting... watching the videos made me sleepy after that". A few other students also mentioned the videos can be distracting at times.

Some videos were distracting because they were too long, as indicated in the feedback. The optimal length for most videos is ³⁰ to ⁶⁰ seconds. Unfortunately, most online videos are not produced for teaching purposes.

Table 2. Contingency table and chi-square test

Contingency table							Chi-square
	1: Strongly disagree	2: Somewhat disagree	3: Neutral	4: Somewhat agree	5: Strongly agree	Total	
Q1: The videos were relevant to the subject							10.54**
AY ^{08/09}	1	3	7	34	15	60	
AY ^{09/10}	0	0	2	35	28	65	
Total	1	3	9	69	43	125	
Q2: The videos were overall objective and unbiased							4.69
AY ^{08/09}	1	1	20	28	10	60	
AY ^{09/10}	1	0	13	34	17	65	
Total	2	1	33	62	27	125	
Q3: The videos increased my interest in the subject							6.90*
AY ^{08/09}	0	3	17	24	15	59	
AY ^{09/10}	0	2	8	28	27	65	
Total	0	5	25	52	42	124	
Q4: The videos were effective in making connections between theory and real world							3.79
AY ^{08/09}	0	1	7	36	16	60	
AY ^{09/10}	0	0	3	38	23	64	
Total	0	1	10	74	39	124	
Q5: The use of videos did not disrupt my concentration							8.92*
AY ^{08/09}	1	12	19	18	10	60	
AY ^{09/10}	3	4	15	31	12	65	
Total	4	16	34	49	22	125	
Q6: Overall the use of videos was effective							8.99*
AY ^{08/09}	1	4	15	29	11	60	
AY ^{09/10}	0	0	10	35	20	65	
Total	1	4	25	64	31	125	
Q7: Recommend the continued use of video sources in classroom teaching							7.44
AY ^{08/09}	1	4	11	28	16	60	
AY ^{09/10}	0	1	6	29	28	64	
Total	1	5	17	57	44	124	

Note: The null hypothesis is that the two cohorts do not differ in the satisfaction level.

** and * indicate 5% and 10% levels of significance, respectively.

AY^{08/09} and AY^{09/10} denote the academic years of ^{2008/2009} and ^{2009/2010}, respectively.

and often exceeded the optimal length for such purposes. However, over-trimming a video clip can disrupt the flow of ideas.

Students may value a video clip differently. Although many appreciated the videos as they “encompassed not only Singapore examples but also those from other countries”, which allowed the students to “better apply the economic theories after obtaining deeper understanding”, some students thought that “videos were not all related to Singapore context, so overall there was not much difference whether the videos were shown or not”. Furthermore, students who were more examination oriented thought that “it was better to explain the points directly” as “videos did not really provide points and information often needed for exams”.

CONCLUSION

This paper aims to identify the values and challenges of using short videos in teaching Real Estate Economics, a social science subject. In conclusion, relevant videos can link theoretical knowledge with real-world practices, increase student interest in a subject, and stimulate their critical thinking. It can also enliven the lectures and help the students to stay focused. The pedagogical experiment is a fruitful experience overall. However, the implementation of the pedagogy is not without difficulties. Firstly, relevant and objective videos are difficult to find, and students may have different views on what objectivity is. Even when good videos are found, their length may not be optimal for teaching purposes. Overly long videos can be distracting, but trimming videos to shorter lengths might be distracting too. This makes finding appropriate videos a challenging task. Moreover, timing for showing videos is important, as inappropriate control can disrupt concentration. Fortunately, experience can ease this problem and achieve substantial rewards.

Some of the findings can be further studied. The research finds that using short videos might not uniformly benefit all students. Traditional pedagogies have the same shortcoming. Are students who benefit less from viewing videos also benefiting less from traditional pedagogies? If this is the case, will the use of videos broaden the disparity of learning outcomes? If the answer is also positive, future research should look at how to improve the use of videos, so that students in the lower tail can benefit more. Additionally, research can study video-trimming principles that minimize distraction, so that there will be less tradeoff between playing long videos and trimming

videos. Future research can also study whether the complementarity between using multimedia and traditional pedagogies differs across disciplines.

Although the study was conducted at a Real Estate department, educators in other academic departments would also find the results in this article informative and helpful. In conclusion, using short videos in teaching social science subjects is feasible and rewarding, but requires substantial efforts.

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