

# A COMPARATIVE STUDY OF POST-CLASS LECTURE VIDEO VIEWING

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## ABSTRACT

The objective of this study is to compare students' willingness and viewing behavior of using the online taped lecture video for their studies. The lecture video was taped from one class and made available to both sections of the same course. Students in one section can view online lecture video captured in their class, while students in the other section, taught by the same instructor, can also view the same lecture video from the other section. Data including course website usage statistics, student questionnaire, student interviews and course instructor interviews were collected and analyzed. The study yielded two main results: (1) Students are more willing to use the taped class lectures for reviewing purpose if the taped video is from their own class, as oppose to from another class; (2) students who viewed lecture video more frequently had higher application-specific self-efficacy than those that do not.

## KEY WORDS

Lecture Video, ICT integration, On-line education

## 1. Introduction

Taping in-class lectures and make them available on the Internet affords students opportunities to review the lectures, further rehearse the lecture material, and develop deeper levels of understanding, including major or minor topics that are initially ignored [9]. Because of the friendliness of web interface and the development of streaming technology, many web lecture browsing systems were developed, such as Lecture Browser system of Cornell University [11], Forum system [3] and Flatland system [13]. Chen et al. [6] also designed a lecture system for distance education. Recently, many universities begin to enhance students learning in the campus courses by putting taped in-class lectures on the course website. The student responded positively and the dropout rate was successfully reduced [12]. Students also gave significantly higher rating to such courses [8].

Although there were some experimentations about making the in-class lecture videos on-line, formal feasibility of such practice has not yet been studied.

Many research [3][11][13] focused on the technology and development of system architecture and functions, and less on the actual educational applications. Although there seems to be many benefits of having in-class lecture videos available on-line for students' study, the effort to capture the lecture video and post-processing the videos before making them available is not trivial in most lecture settings and classrooms. It is plausible that if the same course is taught in many sections (or in consecutive semesters), then perhaps the same course can be taped once and be used repeatedly. However, such practice still needs to be experimented. Furthermore, no formal study has been conducted on the relationship between the frequency of using the on-line lecture resource and students' learning effectiveness. In addition, what are the reasons for using or not using the lecture videos to aid student's study? It is the goal of this study to investigate and answer the above questions.

The behavior of each student is influenced by his personal characteristics. In the subject of integrating technology to assist learning, individual characteristics of concern may include computer self-efficacy and the motivation to devote himself to learning. Self-efficacy is defined as someone's judgment of his own capability to perform something [1]. It might impact how much effort an individual is willing to invest and what strategies to take when encounter challenges or difficult problems. Computer self-efficacy includes general computing knowledge and some specific application skills. Application-specific skill is one's perception of efficacy in using a specific computer application or system [5]. In this study, application-specific self-efficacy is used as a scale to measure student's individual characteristics in using online lecture video browsing system. In terms of motivation to learning, achievement goals were used in the present study. Achievement goals include mastery goals and performance goals. Mastery goal is individual's desire to master the domain knowledge, whereas performance goal emphasizes the degree which someone focuses on his performance capabilities relative to others [2]. These two goals may both influence students' motivation to learning.

## 2. Research Methods

### 2.1 Basis and Limitations

This study was carried out in a college level course. The course instructor made use of electronic slides in her lectures. There are two reasons for this restriction:

1. Use of electronic slides for instructional purposes is common in college.
2. Each slide usually contains cohesive part of lecture which makes change of slide a good segmentation point in the taped lecture video.

### 2.2 System and Tool

An in-house course supporting website was developed. It houses the course syllabus, the course notes, the class handouts, the presentation slides, the lecture videos and a discussion forum. A snapshot of the website is depicted in Figure 1. The screen is divided into four frames: the video playback frame, the current slide frame, the discussion thread frame and the lecture slides frame. The lecture slides frame contains the set of slides used in one lecture period. Each slide also corresponds to a starting and ending time in the taped lecture video in which the slide was being lectured. When clicked, that slide is enlarged in the current slide frame, the corresponding lecture segment is played in the video playback frame and the corresponding discussion thread is displayed in the discussion thread frame. Therefore, students are able to watch and listen to the lecture corresponding to a particular slide and be able to discuss about it at the same time. The website automatically keeps track of the usage statistics, including the number of times each video segment was viewed by each student. A more detail description of the system can be found in [4].



Figure 1. snap shot of website

### 2.3 Subjects

The study was conducted in the junior level “Chinese Grammar” course which was a year-long required course. There were two sections for this course and the same instructor taught both sections. The classes met for two

consecutive hours per week. The lecture video was captured in class in one section, but was made available to students in both sections on the course website. In other words, students in one section could only view lectured video from the other section, albeit was taught by the same instructor. Section A of the course had 56 students and Section B had 63 students. For this experiment, the lecture in Section A was taped.

### 2.4 Experimental Procedure

The course instructor lectured with PowerPoint slides projected onto a white screen through a LCD projector. We did not ask the course instructors to run the class any differently to take advantage of the course website. The course instructors conducted their lectures primarily with PowerPoint slides. The TAs taped the in-class lectures (50 minutes per lecture) with video camcorder and used the in-house lecture video segmentation system to prepare and upload the video streams onto the course website within 2 days after the lecture. The students can then view the taped lecture video at anytime from any place where Internet is available. At the beginning of the semester, we demonstrated to the students on course website usage and to on-line lecture video viewing procedure. Students were told that accessing the online video was voluntary and didn't warrant any extra credits or penalties.

### 2.5 Instruments and data collection

Students were given the questionnaire at the end of the second semester of the course. The questionnaire includes items of application-specific self-efficacy, achievement goals and other questions about their experience in using the course website. The questionnaire contains eighteen 5-point Likert-scale questions. Students rated the answers using a scale of 1 (strongly disagree) to 5 (strongly agree). Application-specific self-efficacy was assessed using four items adapted from prior research [5][10] to measure students' self-efficacy about using the course website. Mastery goals and performance goals were measured with the scales developed by [7].

In addition to students' questionnaire, research data were collected from three other sources. First was the course website usage statistics. Since each student had an individual account on the course website, when and how often each video were viewed were automatically recorded. In order to get more in-depth information, we interviewed randomly chosen students at the end of the semester. The course instructor was also interviewed after the grades have been posted. Interview with the instructor was conducted primarily to validate students' comments about re-viewing the lectures on the web.

### 3. Results and Discussions

Ninety-one percent (51 out of 56) of students from Section A and 87% (55 out of 63) students from Section B completed the questionnaire. Looking at the usage data, we categorize these students in each section into two groups: *users* and *nonusers*. Students were classified into *users* if their usage is among the top 50% in the section. The lower half ones were classified as *nonusers*. With this categorization, among the 51 students in Section A, 25 students were classified as frequent *users* and 26 as *nonusers*. As for Section B, 27 were classified as frequent *users* and 28 as *nonusers*.

#### 3.1 Lecture video was viewed by more students in Section A than students in Section B

The course website usage statistics recorded for one year is depicted in Table 1. From column 2, we see that more students in Section A had viewed the lecture video at least once than in Section B (39 to 27). Data of column 3 reveals that students in Section A had a higher average number of videos viewed (46 to 33.5). The result of t-test indicated that there was difference in number of video viewed by students in Section A and Section B ( $t=1.318$ ,  $p=.005$ ). Number of video viewed in Section A is significantly higher than that in Section B.

On the questionnaire, students were asked how they dealt with any learning problems that they have faced through out the year. Students were asked to check off two of four possible pre-suggested remedies. The result is depicted in Table 2. In Section A, *users* are almost equally likely to watch the lecture video again (18), discuss with peers (17), and search the textbook for answers (14). In Section B, the number of *users* using the lecture video to resolve learning problem is considerably lower (7). This is another indication that students prefer looking at familiar videos - that is lecture videos taped in their own class.

In addition, the student questionnaire of Section B contains a question that asks students whether if the video was taped from his section, he would make more use of the taped lecture videos. The result is a resounding yes (average value is 4.1 out of maximum value of 5.0). In interviewing students in Section B, some students said that "It's not very convenient to view video captured in another section. Though the course instructor is the same in both sections, the content and progress still has some differences." The instructor explained that she may change the lecture content and progress pending on students' responses in class. It can be concluded that students of Section A had higher intention to view video than those of Section B. Furthermore, whether on-line lecture video is captured in the student's own section is a significant factor for students to view the video after class.

Table 1. Video viewing statistics of Section A and Section B.

	X* (N*)	Total # of videos viewed	avg. # of videos viewed
Section A	39(51)	1794	46.0
Section B	27(55)	904	33.5
Overall	66(106)	2698	39.8

X\* is the number of students viewed the lecture video at least once.  
N\* is the number of students in class.

Table 2. Students' responses of how to deal with learning problems.

	Section A		Section B	
	users	nonusers	users	nonusers
Discussing with peers	17	26	23	25
Searching the textbook for answers	14	17	19	24
Asking the instructor for advice	1	5	5	4
Watching video again	18	4	7	3
total	50	52	54	56

#### 3.2 Users had higher application-specific self-efficacy than nonusers

Table 3 revealed the results of the responses of application-specific self-efficacy. Cronbach's alpha coefficients were .91 and .92 for the application-specific self-efficacy scale in Section A and Section B, respectively. T-test was conducted to test the difference between the responses of *users* and *nonusers* in Section A and Section B. In these two sections, *users* significantly had higher application-specific self-efficacy than *nonusers* (Section A:  $t=1.237$ ,  $p=.009$ ; Section B:  $t=1.038$ ,  $p=.022$ ). The result indicated that application-specific self-efficacy has a significantly positive effect on the use of lecture video. For students, the belief that they are able to use the course website easily encourages them to view the video.

Table 3. Students' responses of application-specific self-efficacy.

	Section A		Section B	
	users	nonusers	users	nonusers
1. I believe I have the ability to download the file from the course website.	4.56	4.23	4.59	4.11
2. I believe I have the ability to set up video viewing software after listening how to set up.	4.52	4.04	4.22	3.87
3. I believe I have the ability to view video on the course website	4.52	4.12	4.26	3.82
4. If I want to use, I believe I have the ability to use all functions provided on the course website.	4.40	4.00	4.11	3.54
average	4.50	4.10	4.30	3.84

### 3.3 There were no significant differences of mastery goals and performance goals between users and nonusers

The responses of mastery goals and performance goals were shown in Table 4 and Table 5, respectively. For Section A, the Cronbach's alpha coefficients were .87 and .89 for the mastery goal scale and performance goal scale, respectively. For Section B, the Cronbach's alpha coefficients were .88 and .91 for the mastery goal scale and performance goal scale, respectively. T-test was also performed to see the differences between *users* and *nonusers* in these two sections. There were no significant differences on mastery goals and performance goals in both sections (mastery goals of Section A:  $t = .058, p = .954$ ; mastery goals of Section B:  $t = .178, p = .859$ ; performance goals of Section A:  $t = -1.208, p = .233$ ; performance goals of Section B:  $t = .563, p = .576$ ). The value of mastery goals and performance goals can be as a scale that represents the attitude and effort that students are willing to devote on the course. Students who have higher mastery goals may tend to learn as much as they can in the course, whereas those who have higher performance goals may focus on getting a high grade. The result depicted in Table 4 and Table 5 reveals that *users* and *nonusers* in both sections had similar attitude toward this course. It seems that the degree of mastery goals and performance goals didn't significantly influence student's viewing behavior.

We further analyzed whether there is significant differences in achievements among *users* and *nonusers*. With students' permission, grades of *users* and *nonusers* in both sections were collected. One-way Covariance Analysis (ANCOVA) was performed. The grade point averages before this semester were used as the covariate in the analysis. The grades of students are depicted in Table 6. The average course grades of *users* and *nonusers* in Section A were 78.52 and 80.38, respectively. In Section B, the average course grades of *users* and *nonusers* were 82.07 and 84.05, respectively. The ANCOVA results (Section A:  $F = .200, p = .657$ ; Section B:  $F = 3.104, p = .084$ ) indicate that there was no significant difference between achievements of *users* and *nonusers* in the two sections. Therefore, lecture video viewing was not an important factor in student's achievements.

### 3.4 Users in Section A significantly had higher willingness to view video

In Table 7, we compared students' willingness to use the lecture video in the two Sections. From question 2, we see that students in either section are willing to use technology to enhance their learning, even for the *nonusers*. However, when asked about using taped lecture video to aid their learning, students in Section A is much willing to do so (4.26 to 3.89 for *users* and 3.87 to

3.61 for *nonusers*). Results of T-test shows that the willingness for *users* in Section A is significantly higher than *users* in Section B ( $t = 1.088, p = .017$ ). This can be attributed to the fact that the taped lecture was from Section A. And so, students' familiarity with the taped lecture is a strong factor in influencing students' willingness to use it after class. It is also interesting to note that the *nonusers* in either section expressed willingness to watch the lecture videos when in fact they didn't do so.

Table 4. Students' responses of mastery goals.

	Section A		Section B	
	users	nonusers	users	nonusers
1. I want to learn as much as possible in this class.	4.20	4.19	4.22	4.07
2. In a class like this, I prefer course material that really challenges me so I can learn new things.	3.84	3.85	4.00	4.11
3. The most important thing for me in this course is trying to understand the content as thoroughly as possible.	4.32	4.42	4.32	4.44
4. Understanding Chinese Grammar is important to me.	4.08	4.08	4.11	4.07
5. I like it best when something I learn makes me want to find out more.	4.04	4.00	4.11	4.00
6. In a class like this, I prefer course material that arouses my curiosity, even if it is difficult to learn.	3.96	3.85	3.89	4.07
average	4.07	4.06	4.11	4.13

Table 5. Students' responses of performance goals.

	Section A		Section B	
	users	nonusers	users	nonusers
1. It is important for you to do better than other students.	3.00	3.15	3.18	3.37
2. My goal in this class is to get a better grade than most of the other students.	2.84	3.08	3.04	3.19
3. It is important for me to do well compared to others in this class.	3.48	3.69	3.75	3.85
4. I want to do well in this class to show your ability to your family, friends, advisors, or others.	3.12	3.46	3.54	3.37
5. Getting a good grade in this class is the most important thing for my right now.	3.04	3.23	3.18	3.33
6. It is important for me to establish a good overall grade-point average, so my main concern in this class is getting a good grade.	3.20	3.38	3.36	3.56
average	3.11	3.33	3.34	3.44

Table 6. The grades of students.

	Section A		Section B	
	users	nonusers	users	nonusers
Grade point average	83.94	83.68	83.23	83.39
Average course grade	78.52	80.38	82.07	84.05

Table 7. Students' responses of willingness and attitudes toward integrating technology in learning.

	Section A		Section B	
	users	nonusers	users	nonusers
1. I am willing to view lecture videos after class if necessary.	4.26	3.87	3.89	3.61
2. I am willing to use technology to aid my learning in school.	4.44	4.39	4.41	4.30

## 4 Conclusion

In this study, we compared students' willingness and viewing behavior of using the online taped lecture video for their studies. The lecture video was taped from one class and made available to both sections of the same course. There are two major findings from our research. The first is that students are more willing to use the taped class lectures for reviewing purpose if the taped video is from their own class, as oppose to from another class. The second major finding is that students who viewed lecture video more frequently had higher application-specific self-efficacy than those who did not. Students who are more confident in using technology are more willing to use technology to assist their learning. These findings of this study pave a way for future practices of putting lecture videos on a course website.

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