Educ Inf Technol (2011) 16:383–393
DOI 10.1007/s10639-010-9140-x

Video lecture capture (VLC) system: A comparison of student versus faculty perceptions

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Published online: 7 August 2010

Abstract A Video Lecture Capture (VLC) system was implemented to address issues relating to retention, and to reverse the trend of high drop, failure, and withdrawal (DFW) rates. The purpose of this study was to examine student perceptions of how using VLC impacted their academic performance. Areas of interest surrounded students' perceived benefits, value, and helpfulness of using the system. In addition, the study probed the concern of many about the impact using VLC would have upon class attendance. Finally the study compared students' perceptions about their performance as a result of using VLC with faculty perceptions about their students' performance as a result of using VLC. It was hypothesized that there is a significant difference between student and faculty perceptions.

Keywords Lecture capture system · Video lecture · Panopto · Coursecast · Retention · Online learning

1 Introduction

A 2008 EDUCAUSE Learning Initiative defined lecture capture as "... an umbrella term describing any technology that allows instructors to record what happens in their classrooms and make it available digitally." The impetus behind this VLC initiative was to address the increasing problem at the university with students dropping, failing, and withdrawing (DFW) from classes each semester. The institution is a four-year state supported university, with a diverse student population that is majority African American, and approximately 16% white. The university's institutional research studies have shown a constant decline in retention as a result of high DFWs. Presently the retention rate is roughly 14%, among first-time freshman,

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which is alarmingly low. A number of different approaches have been taken to address this issue. Some of these approaches included modifying tutoring services, increasing mentorship initiatives, following up with at-risk students at shorter intervals in the semester in order to monitor their progress, providing remediation, among other efforts.

Since the core of students' academic success centers around what happens in the classroom, the VLC approach seemed to be a good solution for enhancing student performance. Chandra (2007) noted that earlier work had shown positive learning impact of the ability to review class lecture videos. A 2009 TechSmith article asserted, "Showing a return on investment in hard dollars can be challenging, but when you consider the many areas where lecture capture can improve the learning environment while meeting a tight budget, the benefits can be very attractive." This article also suggested that capturing classroom content can help institutions offer their students the materials they need to succeed in the formats they are demanding.

Lectures captured using digital video and made available using streamed video allows students to review at their own pace the information the instructor explained. They can also view any associated visual aids and search for concepts and resources relating to those aids. Lectures captured in this way may help students overcome weaknesses in areas such as taking notes, paying attention over extended periods of time, or dealing with annunciation challenges presented by some ESL faculty. McClure (2008) quoting Isaac Segal, CEO of Tegrity, stated, "The average professor speaks at 120 words per minute, but students write around 20 words per minute." This discrepancy obviously places students at a major disadvantage.

Another very important aspect is the ability to make remediation sessions available so that students who may lack certain skills can remediate without having to spend class time doing so. With this in mind, using VLC places the core of what affects students' academic success, which is the professor's perspective on the course material, at the student's disposal. Lucas (2008) asserted, "... we can literally create a vast library of online learning assets and pursue new publishing opportunities within the greater higher education community without adding staff or making significant technology investments." A survey conducted at the University of Wisconsin-Madison (Veeramani and Bradley 2008), concluded that undergraduate students value the webcasting of lectures and that, given the choice, would prefer a course in which lecture content is recorded and streamed over one that is not.

A very important area of concern for professors and administrators was the effect using a VLC might have on class attendance. In other words, why should students attend classes if everything that occurs in the classroom can be viewed online? Briggs (2007) cited data from Temple University which indicated, "... virtual offerings actually increase student attendance." DeAngelis (2009) also affirmed that the majority of students still attend classes, even when a lecture capture system is in place. McClure (2008) contends that when lecture capture is proposed, a typical concern is that students will stop attending classes in favor of watching the recordings, but the consensus is that it does not happen, or at least, not to a noticeable degree.

The answer to the question of attendance depends heavily on the professor's pedagogical approach. Kolowich (2009) pointed out that well-attended lectures were

well-watched, while poorly-attended lectures were not watched. Kolowich made the point by referring to Stringer, whose research at Stanford University showed that if professors are bad in face-to-face lectures, they will most likely, be bad online and students will not come to class in either case. Our experience showed that attendance is less of a problem when viewing the lecture online is a pre-requisite for class activities, a quiz or test, or to clarify important information that was given in class.

The use of VLC systems is increasing, and many academic institutions are now using them. Since the inception of its use on our campus, students and faculty demand for the system has increase. This trend seems to be in step with the university community at large. Nagel (2008) noted that lecture capture has been gaining momentum, but that momentum is being outpaced by student demand.

This paper will describe the process involved in implementing and studying the results of using a VLC. A summary will be provided of some of the technical aspects of setting up the VLC, synchronizing it with the Learning Management System, and training faculty. Discussion will also focus on the methodology used, including instrumentation, population, data collection, and results. A summary will also be provided to synthesize the process and the meaning of the results gathered.

2 Setting up the VLC

Once the decision was made to explore the use of a VLC, a review of products commenced. This process began with an examination of products that are already available on campus. Other vendor products were also reviewed, however, we settled on Panopto by Coursecast based on functionality, price, and their willingness to allow a no-obligation testing period.

At the end of the testing period we began a pilot study using Panopto (Coursecast) software. Starting in the fall 2009 semester we synchronized the system with our Blackboard Learning Management System so that students who have access to Blackboard would automatically have access to their videos. This was quite a challenge at the beginning but worked rather smoothly by the end of the semester. Figure 1 is a snapshot of what the Panopto recorder looks like. Essentially, the red button indicated is all a user needs to click to start the recorder.

3 Method

The study commenced with an Institutional Review Board (IRB) request which was approved at the beginning of fall 2009 semester. Many of the faculty members (faculty) who were invited to participate in this study and whose courses were selected were those which institutional research data had shown high drop, fail, and withdrawal rates. It was important to use such courses because if the hypothesis proved correct, the impact of the intervention would be clear and immediately beneficial for students in those courses. This selection approach also accounts for the disproportionate number of faculty from science disciplines. The study began with a total of nine faculty teaching 16 course sections. However, two of the faculty withdrew, leaving seven and 13 sections.

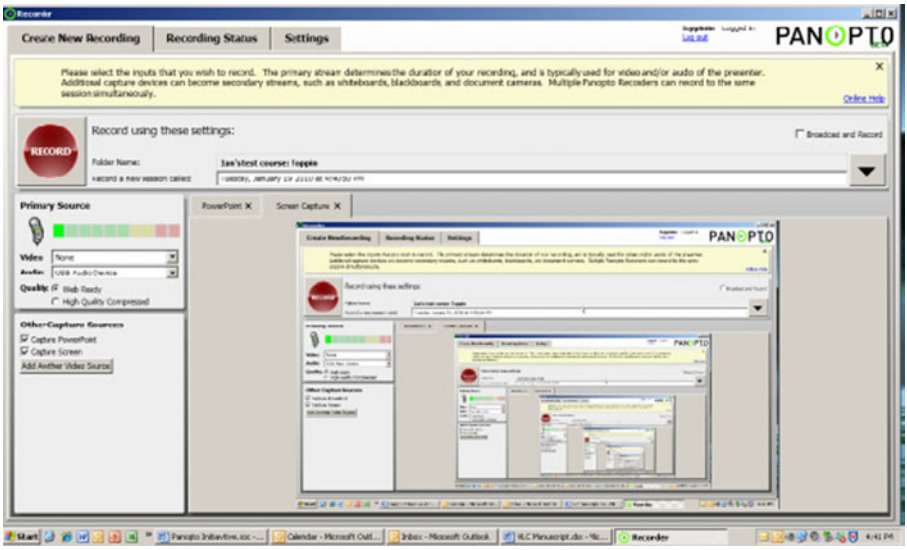

Fig. 1 Panopto recorder

4 Instrumentation

At the beginning of the study students in each participating class were asked to complete an "Informed Consent Form" to inform them of the study, its purpose, and to gain their consent to use the results. A pretest survey was administered to gather baseline data from students. The survey was not formally validated, however, a sample of the items included: Have you taken this course before? If they had previously taken the course and did not pass it, follow-up questions asked: In your opinion, what are the reasons you did not successfully complete this course in the past? Please circle the reason you are taking this course again (I received a 'C', I received a 'D', I received an 'F', I dropped the course, I withdrew from the course). Are you taking this course with (the same instructor? A different instructor?). As an identifier, students were asked to provide their campus email address. Demographic requests included: What is your gender? In which range does your age fall? What is your classification? In addition to being a student, do you also work during the semester? If you have a job during the semester in addition to being a student, how many hours do you work? In which of the following ranges does your GPA fall (Less than 2.0, between 2.0 and 2.5, between 2.6 and 3.0, between 3.1 and 3.5, over 3.5)?

A post-test survey was also administered. Once again this instrument was not formally validated, however, a sample of the items included: "Please indicate your email address," (in order to compare responses with those on the pretest). How many different video lectures did you view during this course (0, 1 to 2, 3 to 4, 5 or more)? Were the videos you viewed pre-recorded outside of your class? Were the videos you reviewed recorded live during your class? Which style of video did you find most helpful to you (prerecorded, live, no preference)? On average, how much time would you say you spent reviewing each video (less that 5 min each, between 6 and 10 min each, between 11 and 20 min each, between 21 and 30 min each, more than 31 min

each/entire video)? On a scale from 0 and 10 (10 being the highest), how beneficial were the videos viewed to your understanding of the concepts during this course? On a scale from 0 to 10 (10 being the highest), how valuable were the videos you viewed during this course? Overall, how beneficial do you think these types of videos are for student learning?

Faculty also responded to a survey in order to get their perspectives and to determine if student perceptions correlate with those of their professors. Our hypothesis is that there is a significant difference between students' perceptions about their performance as a result of the use of VLC and the perceptions of faculty about students' performance as a result of the use of VLC.

5 Participants

The population for this study was majority African American college students enrolled in the courses selected for the study. A total of 392 students signed consent forms to participate in the study. However the pre-test each faculty was asked to administer in their course was completed by a total of 319 respondents, 78 (24.7%) are male, and 238 (75.3%) are female. There were 85 freshman (27%), 104 sophomores (33%), 74 juniors (23.5%), 37 seniors (11.7%), and 15 (4.8%) second degree students. A majority of students reported their GPA to be between 2.6 and 3.0 (see Fig. 2). A majority were also repeating the course in the study because they had either previously failed, or received a grade of "D" (see Fig. 3). Post-test responses were significantly lower with only 162 (50.8%) of the number of students who responded to the pretest, responding to the posttest.

6 Data collection

Data was collected online using Surveymonkey.com. URL links to the survey were sent to each of the faculty, who were then responsible for forwarding the links to

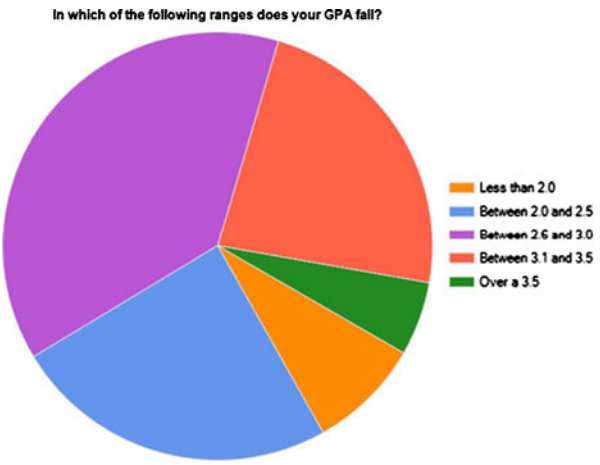

Fig. 2 GPA distribution

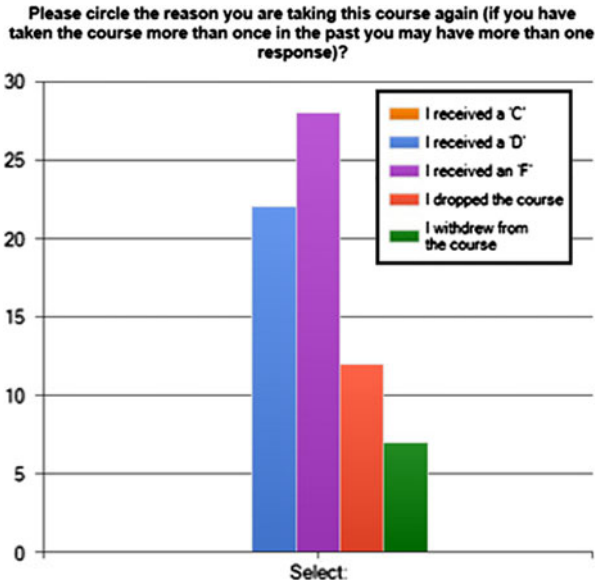

Fig. 3 Grade distribution

their students. The pre-test was made available on August 26, 2009, and closed one month later. The post-test was made available November 18, 2009, and closed on December 11, 2009. The faculty survey was also closed on December 11, 2009.

7 Results

7.1 Students' feedback

A number of demographic items were asked on the pre-test, many of which were discussed in the section on population. The following chart (Fig. 4) summarizes students' responses to questions relating to their interactions with the video lectures.

How many different video lectures did you view during this course?							
n	0	1-2	3-4	5>			
159	10 (6.3%)	49 (30.8%)	45 (28.3%)	55 (34.6%)			
Which style of video did you find most helpful to you?							
n	Pre-recorded	Live	No Preference				
159	64 (40.3%)	46 (28.9%)	49 (30.8%)				
On average, how much time would you say you spent reviewing each video?							
n	<5 minutes	6-10 minutes each	11-20 minutes each	21-30 minutes each	>30 minutes/ entire video	Mean SD	(σ)
154	18 (11.7%)	39 (25.3%)	29 (18.8%)	29 (18.8%)	39 (25.3%)	30.8	3.21

Fig. 4 Responses to interactions with the VLC

Faculty were allowed to decide which approach to take in creating their video lectures. However, these results support our preference for faculty to pre-record, because it allows students to review material before coming to class and the activities (i.e. opening discussion, in-class exercises) can be centered around information students have already seen on the VLC. If students were in class for live recordings, our experience has shown that they were more unlikely to view the lecture again using the VLC.

When asked, on a scale from 0 to 10 (10 being the highest), how beneficial were the videos viewed to their understanding of the concepts taught in the course, student perceptions were very high, 76.6% of the responses were 7>. Again, when asked, on a scale from 0 to 10 (10 being the highest), how valuable were the videos they viewed during the course, most (80.2%) of responses were 7>.

As it relates to the issue of attendance, this study affirmed the findings of other studies which indicate that using lecture capture does not negatively impact class attendance. Results showed that using VLC had no effect on attendance for 85.9% of students. Over 11% (11.5) actually stated that it increased their attendance, while only 2.6% indicated that it reduced their class attendance (see Fig. 5).

The majority of students (67.7%) affirmed that using VLC is very beneficial to student learning (Fig. 6):

The following additional results (Fig. 7) showed students' perceptions about the use of VLC in helping them to prepare for class assessments:

These results were mostly positive. Very few students disagreed with any of the items in this area. The area for concern is related to why so many students were neutral, especially on the question about whether or not the VLC helped in preparing them for class discussions. One can only speculate that this neutrality may have been related to the variety of classes in the study, where class discussions may have occurred on a more frequent basis in some classes over others. However, in every case the results indicated that students' perceptions about the use of VLC in helping them prepare for class were positive.

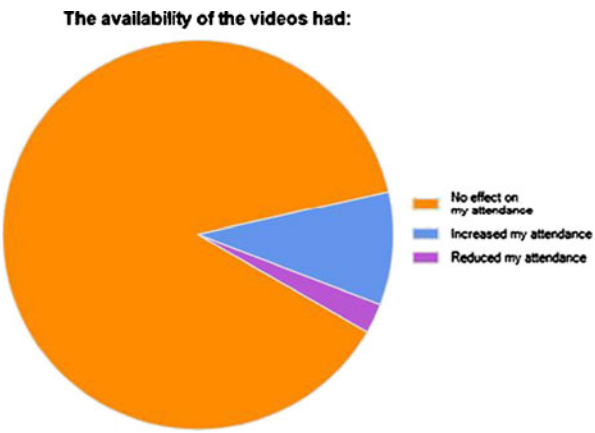

Fig. 5 VLC's effect on class attendance

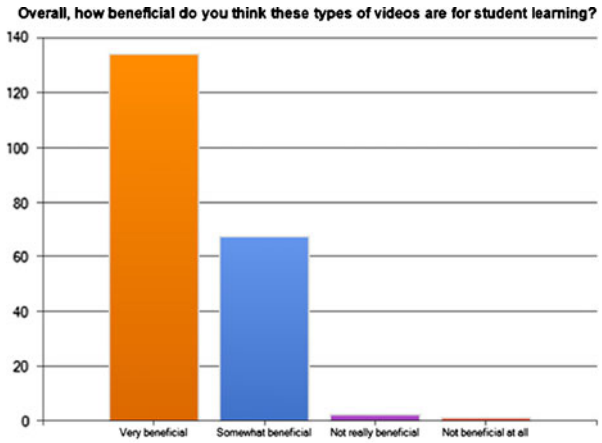

Fig. 6 Benefit of VLC on student learning

8 Faculty feedback

The sample size of faculty who participated in the study (7) was relatively small when compared to the number of students (319) who participated. Therefore, any correlations between student and faculty perceptions were made with this as a backdrop. When asked how many video lectures they made available, 100% (7) of faculty responded that they made five or more available. The majority, 85.7% (6), also used the in-class recording model. Fifty percent (3) offered incentives to entice students to view their video lectures. Most, 83.3% (5) agreed that using VLC had no effect on student attendance, while 16.7% (1) indicated that it reduced student attendance. Sixty seven percent noted that there were apparent learning performance differences between students who viewed certain topics versus those who did not. Other feedback is cited in Fig. 8.

Figure 9 shows the calculations and results for a *t*-test, which was done in order to take a closer look at student versus faculty perceptions, notwithstanding differences in sample size. Items which were essentially the same questions on both instruments were asked of students and faculty. An average (X^2 and X^1) of the scores on each item was calculated, differences were calculated (D) and differences squared (D^2), so that the results could be used in the formula below to determine *t*.

Criteria	Strongly Agree	Agree	Disagree	Neutral
Video recordings were a convenient way to access material	90 (57.3%)	54 (34.4%)	1 (.64%)	12(7.6%)
Video recordings helped me prepare for quizzes	74 (47.1%)	58 (36.9%)	4 (2.5%)	21 (13.4%)
Video recordings helped me prepare for exams	74 (47.1%)	54 (34.4%)	9 (5.7%)	20 (12.7%)
Video recordings helped me prepare for class discussion	58 (37.2%)	50 (32.1%)	8 (5.1%)	40 (25.5%)
Video recordings helped me in my overall material review	76 (49.4%)	58 (37.7%)	2 (1.3%)	18 (11.5%)
Video recordings helped to clarify concepts discussed in class	78 (50%)	59 (37.8%)	4 (2.6%)	15 (9.5%)

Fig. 7 Perceptions about the use of VLC in class preparation

Criteria	Strongly Agree	Agree	Strongly Disagree	Disagree
Panopto recorded lectures were a convenient way for students to access course information	66.7% (4)	0%	2	1
Panopto recorded lectures helped students to prepare for quizzes	33.3% (2)	50% (3)	0	1
Panopto recorded lectures helped students to prepare for exams	33.3% (2)	50% (3)	1	1
Panopto recorded lectures helped me in my overall effort to present course information to students	16.7% (1)	50% (3)	1	0
Panopto recorded lectures helped to clarify concepts discussed in class	16.7% (1)	50% (3)	0	2

Fig. 8 Perceptions about the usefulness of VLC

9 Test of null hypothesis

The null hypothesis stated: There is a statistically significant difference between students' perceptions about their performance as a result of the use of VLC and the perceptions of faculty about students' performance as a result of the use of VLC. In other words, mu_1, student perceptions scores will be significantly greater than mu_2, faculty perceptions scores (H_0: $\mu_1 > \mu_2$). There were twelve items on the survey, which were designed to compare the perceptions of students versus those of faculty. The table above indicates scores of each and the results of the hypothesis test.

A *t*-test was done to compare student and faculty perception scores. The calculated *t* value as shown above is 4.04, and the degrees of freedom ($df = n\text{-}1 = 12\text{-}1 = 11$). At *.025* alpha level, the critical value as shown in the table is 2.201, two tailed and $P = .0019$. The purpose of the two-tailed test is to compare mean scores of mu_1 (student perceptions), and mu_2 (faculty perceptions). The results received in this study was an indication that there was a statistically significant difference between students' perceptions about their performance as a result of the use of VLC and the perceptions of faculty about students' performance as a result of the use of VLC. At the.05 ($\alpha = .05$) level when a one tail test was done, it was found that $P = .00097$ and the critical value was 1.796. Again this indicated a statistically significant difference between students' perceptions about their performance as a result of the use of VLC and the perceptions of faculty about students' performance as a result of the use of VLC. Therefore, accept $H_{0,}$ if $p \leq .05$. Also accept $H_{0,}$ if $t \geq 1.796$. In both cases the null hypothesis must be accepted since p (.00097) is <.05, and *t* (4.04) is >1.796.

10 Discussion

Descriptive results from this study clearly showed that the use of VLC has tremendous potential for improving student performance. Students valued VLC as a supplement to their traditional lecture format and affirmed that it helped them to understand concepts taught in the course. More detailed analysis using *t*-test showed there is a statistically significant difference between student and faculty perceptions about performance as a result of using VLC. Students indicated more exaggerated perceptions about their performance than their faculty members did. A major concern of the study was the impact use of VLC would have on students' class attendance. Results affirmed the findings of other studies which indicate that using

Comparison of Student and Faculty Perceptions

Item	StudentPosttest X^2	Faculty Post-test X^1	Difference (D) (X^2-X^1)	D^2
1	83	89	-6	36
2	83	56	27	729
3	94	78	16	256
4	97	56	41	1681
5a	89	44	45	2025
5b	81	56	25	625
5c	79	56	23	529
5d	67	0	67	4489
5e	83	56	27	729
5f	85	67	18	324
5g	85	78	7	49
5h	86	89	-3	9
Totals	**1012**	**725**	**287**	**11481**
	Observations	**12**	**12**	
	***df*=(*n*-1)=(34-1)=**	**11**	**11**	
	Variance	**56.79**	**573.90**	
	Stand. Dev.	**21.23**		
	P(T<=T) One-Tail	**.00097**		
	T Critical One-tail	**1.796**		
	P(T<=T) Two-Tail	**.0019**		
	T Critical two-tail	**2.201**		
	Ttest result	**4.04**		

$$t = \frac{\Sigma D}{\sqrt{\frac{n\Sigma D^2 - (\Sigma D)^2}{n-1}}} = \frac{287}{\sqrt{\frac{12(11481) - (287)^2}{11}}} \qquad \frac{287}{\sqrt{= (137772) - (82369)}{11}}$$

$$\frac{287}{\sqrt{\frac{55403}{11}}} = \frac{287}{70.97} \qquad t = 4.04$$

Fig. 9 *t*-test calculation

lecture capture does not negatively impact class attendance. Feedback from the majority of students and faculty showed that using VLC did not have a negative effect on class attendance and actually caused increased attendance for a few

students. The disproportionate sample size of students versus faculty was a definite concern for this study. However, if these results were to be extrapolated to the wider campus community, the recommendation would have to be made to expand the use of VLC.

11 Conclusion

Descriptive results in this study showed highly positive student and faculty responses to the impact of using VLC. Most indications seemed to suggest that using VLC can potentially play a vital role in increasing academic performance and thereby improving retention. Sample sizes for student versus faculty participation were disproportionate, and certainty of this widespread impact will only be known in absolute terms when use of the VLC increases across every discipline on campus. Meanwhile, these results provided encouraging signs for the prospective use of the system. And, most importantly student and faculty results dispelled the assertion that using a VLC system might decrease class attendance. In fact, results from this study agree with the body of knowledge, which refute that fact, and which shows the contrary to be more accurate. On the aspect of student perceptions about their performance as a result of the use of VLC versus faculty perceptions about students' performance, more work needs to be done to close that gap and to insure that students' perceptions about their performance are more realistic.

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