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If We Build Them, Will They Watch? A Preliminary Analysis of Students' Use of Professor-Created Videos in an Undergraduate Visual Basic Programming Class

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Abstract

This study examines the usage statistics of videos implemented in an undergraduate Visual Basic programming course in an attempt to draw some conclusions about whether the creation of video demonstrations as a learning resource in an online course is worth the professor's time and effort. Analysis of the usage statistics indicated that a large percentage of the total number of students' hits on the professor-created video demonstration links were by a relatively small number of students. Data was also analyzed with a nonparametric correlational analysis, which determined a weak, negative correlation between students' mean lab scores and the percentage of total number of hits with the professor-created videos. This brings the cost-benefit of the professor's time and energy invested into the creation of the videos into question.

Keywords: video demonstrations, video lectures, e-lectures, online education, programming

1. INTRODUCTION

Not too long ago the question was posed, "*If we build it, will they come?*" in reference to the adoption of online video-based distance learning (Geri, 2011). The purpose of this paper is to build upon this question by asking, "*If we build them, will they watch?*" This question is specifically related to the creation of video demonstrations as a learning resource in online courses. This study examines students' usage statistics of professor-created videos implemented in an undergraduate Visual Basic programming course in the Department of Computer Information Systems in an attempt to determine whether the extensive effort to record, edit, and preview videos in an online course is an effective use of the professor's time.

It seems apparent that online learning is here to stay, and in fact, will continue to grow in the near future. This is nowhere more apparent than in the computing and technology disciplines. A quick Internet search will reveal that many computing and technology departments in higher education already offer completely online master degree programs and are moving or have already moved toward the offering of fully online undergraduate programs as well.

This move is not limited to only traditional online or regional universities; large, brick-and-mortar

universities are also beginning to enter this arena. For example, Georgia Tech recently announced (May 14, 2013) their intention to offer "the first professional Online Master of Science degree in computer science (OMS CS) that can be earned completely through the 'massive online' format" (Maderer, 2013, para. 1). It is expected that this degree program will be offered at an estimated cost of $7,000, which is significantly less than a traditional face-to-face or online master's degree program.

Other trends impacting online education include the Open Learning Initiative (OLI) and Massive Open Online Courses (MOOCs). Mehaffy (2012) reported that "more than 15,000 free courses are now available on the web" (p. 16). Leading the way in the OLI are prestigious institutes of higher education, such as Carnegie Mellon University, MIT, and Harvard. Each of these institutions has a web site for accessing free online courses. According to Mehaffy (2012), OLI courses have the advantage of being created by teams of experts with well-constructed strategies for evaluating students' performance and improving course content.

Not only have Harvard and MIT lead the way in the OLI, they have also expanded into the MOOC movement through the creation of EdX. However, they are not the only well-known universities to enter this arena. Coursera was created by Stanford, Princeton, Michigan, and Penn, which was intended to "provide free MOOCS for the world" (p. 20). Sebastian Thrun, a tenured professor at Stanford, actually resigned to create Udacity, which offers free courses online as well (Mehaffey, 2012).

Competition in the online learning environment is increasing and thus facilitating the need to develop high-quality courses that will attract and retain the growing number of online students. It has been suggested that one way to help improve the quality of online education and enhance the learning experience for online students is through the use of professor-created video demonstrations, which are sometimes referred to as e-lectures or video lectures (e.g., Brecht & Ogilby, 2008; Geri, 2011; Jadin, Gruber, & Batinic, 2009; Lents & Cifuentes, 2009). However, the creation of video content can be quite time intensive for a professor, and there is the possibility that the videos will be underused or not used at all depending upon the interest of the students, the relevance of the content, and the quality of the videos themselves. Thus the question, "If we build them, will they watch?"

2. LITERATURE REVIEW

The use of videos in education is not a new phenomenon. As far back as film strips on reels progressing on to VCRs, DVDs, and now streaming digital content, educators have attempted to harness this technology to enhance the learning of students. Currently, video players, such as NBC Learn, Films on Demand, and to some degree YouTube, provide a wealth of digital video via the Internet for educational purposes, both in the classroom and online. The creation of custom video content is also on the rise through sophisticated, high-end video recording and editing software, such as Panopto®, Adobe Captivate®, and Camtasia Studio®. These software packages bring the power of creating professional quality video to the desktops and laptops of educators.

In the information systems (IS) field specifically the impact of video on learning effectiveness has been studied dating at least back to the mid-2000s (Zhang, Zhou, Briggs, &, Nunamaker, 2006). More recently an IS-related study explored the use of professor-created video demonstrations as an instructional tool in an introductory programming course offered in both face-to-face and online formats (Sharp & Schultz, 2013). The authors were interested in determining how students used these videos and whether or not there were differences between the two groups (i.e., face-to-face students versus online students). The authors found that there was no statistically significant difference between the groups with regards to hours viewing the videos when compared to hours reading the course textbook. However, the authors reported that both groups did spend more time viewing the videos than reading the textbook. Related to this finding, approximately 83% of students from both groups reported a preference for the videos over the textbook, 94% of students indicated that the professor-created videos were useful, and 80% of students reported that they felt they "knew" their instructor better through viewing the videos. However, no statistically significant difference was found between the two groups with any of these three findings. The authors concluded that even though the creation of videos was time intensive for the professor, due to the "high level of reported usefulness and the fact that many students depended on the video more than their textbook to un-

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derstand the concepts in the class (p.38)," indicated that the investment of time for the professor was well worth the effort.

The advantage of videos over textbooks was also cited by Brecht and Ogilby (2008) who proposed that video lectures provided additional instruction to students beyond the textbook. Brecht and Ogilby reported that students' use of professor-created video lectures enabled students to improve their overall course grades and reduced course failure rate. Moreover, the professor-created videos were useful resources for students during final exam preparation because students had access to video lectures related to course content during the entire semester.

Brecht (2012) sought to discover the benefits that students might gain from the use of video lectures. Using three different video designs Brecht collected and analyzed survey data and grade distributions from a total of 381 undergraduate students in an introductory course in financial accounting. Ultimately the study indicated that video lectures acted as a tutorial providing additional help, improved initial learning, reduced drop out rates, and improved overall course grade.

Another term commonly used for video in a course is lecture capture. In a study conducted by Euzent, Martin, Moskal, and Moskal (2010) an online lecture capture course in economics was compared to the same face-to-face economics course to assess student performance and perceptions between the two types of course delivery. As with other studies investigating online versus face-to-face classes, the authors concluded that there were no significant differences in student performance between the two delivery modes. However, the study indicated that the students perceived that in the lecture capture course they had more flexibility and control of their learning as in face-to-face courses they had taken. They liked the convenience of the delivery mode, and interestingly, the instructor of the lecture capture course received slightly better student evaluations ratings. In conclusion the authors believed the results for the lecture capture course to be quite positive and suggested that "this course delivery modality may be a viable alternative to large section face-to-face instructions and a means to increase course access for students" (p. 303).

While many studies focus on the implementation of prerecorded video lectures or lecture capture, an interesting use of video as an element of a course is presented by Chilton (2012). Rather than presenting prerecorded material Chilton elicited the assistance of alumni to participate in real-time video in a virtual classroom as part of the project in a Management Information Systems (MIS) capstone course via video links and collaboration software to facilitate experiential learning. An overall goal of the study was to assess the results of attempting to train students on techniques used by companies while still attending college rather than waiting until after graduation. Assessment revolved around multiple factors including: feedback sessions, class participation, surveys, software artifacts, project deliverables, presentations, and peer evaluations. The results indicated that there were benefits and disadvantages for the various participants including students, alumni instructors, participating companies, professors, and the university as a whole. Chilton noted that overall benefit is that "students become more competitive in the market . . ." and "other companies hear about such work and begin to offer to take part" (p. 61).

Will they come? Because of the capability of video lectures to mimic the rich learning experience of the traditional classroom, Geri (2011) believes they will. Geri very much expects that as online education continues to rise and video-based technologies become more available and affordable, "video lectures as a means for distance learning" will increase as well (p. 225).

Will they watch? The hope of this study is to shed some light on this question by examining actual usage statistics of the professor-created videos as presented in the following sections related to the methodology, discussions and conclusions.

3. METHODOLOGY

Video Demonstrations

Each week, video demonstrations of various lengths covering specific topics were posted in Blackboard as a learning resource for students. The videos were recorded using Adobe Captivate 5® and consisted of voice-over software simulations demonstrating the creation of Windows applications in Visual Basic using Visual Studio 2010 Ultimate®. The length of the videos ranged from three minutes to 10 minutes, with an average length of approximately six minutes. The creation of videos was quite time consuming for

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the professor, and the time required to record, edit, and review the video far exceeded the actual length of the completed video. For each video, the investment of time for the professor was estimated at approximately three times the length of the actual video. The videos were only accessible through Blackboard and were viewed in a browser window with controls to start, stop, pause, fast forward, and rewind. A benefit to students was that the videos could be accessed and viewed as many times as desired for a given topic area.

For the purposes of this study, 46 professor-created videos consisting of 270 minutes of instruction were included in the students' usage data analysis. These 46 videos covered course topics delivered during the first unit of instruction and corresponded with Chapters 1, 2, 3, and 4 of the textbook. This unit of instruction took place during the first three weeks of a 10-week summer semester and just prior to the first scheduled course exam. The choice of this time period was determined because students had ample opportunity to access and view all professor-created videos related to course content for this unit of study. Additionally this unit of instruction was chosen to study because the chapters covered represented more elementary Visual Basic functionality prior to the start of more advanced concepts such as function procedures, arrays, etc. Summary information is provided in Table 1.

Table 1: Summary of Video Information

Wk/Ch	#of Videos	Length	Avg. Length
Wk 1/Ch 1	8	58	7.25
Wk 1/Ch 2	8	58	7.25
Wk 2/Ch 3	14	67	4.78
Wk 3/Ch 4	16	87	5.43
Total	46	270	5.87

Participants

The students' usage statistics reflected data collected from 18 undergraduate and two post-baccalaureate students enrolled in an undergraduate Visual Basic programming course. The course consisted of 16 male students and four female students with varying university classifications (see Table 2).

Table 2: Summary of Classification

Classification	
Post-baccalaureate	2
Senior	10
Junior	7
Sophomore	1
Freshman	0

As shown in Table 3, the majority of students declared Computer Information Systems as their major. Students were geographically distributed across multiple campus locations: 16 were coded as main campus students, while the remaining four were coded as either off-campus or distance learners.

Table 3: Summary of Majors

Major	
Computer Information Systems	16
Information Technology	2
Interdisciplinary Business	1
Manufacturing and Industrial Management	1

Data Collection

Students' usage statistics were generated using the evaluation course reports available in Blackboard for the time period reported above. These reports provided various formats for presenting aggregate and individual data for students' activity within the various Blackboard content areas. Specifically, the "All User Activity Inside Content Areas" report provided students' usage statistics for total number of hits for all videos and total number of hits by individual students for a specified time period. From this data, the percentage of students who hit a video demonstration link and the percentage of hits by an individual student in relation to the total number of hits for all videos could be calculated.

Not surprisingly, a cursory analysis of the students' usage statistics indicated the highest percent of usage occurred on Wednesdays, which happened to correspond with the due date for all weekly lab assignments. In some cases usage of videos reached more than 50% on that specific day of the week indicating that students were potential waiting till the last minute.
For content delivered during each of the three weeks (including content in the professor-created videos), students completed corresponding lab assignments. Table 4 shows all 20 students, along with the score earned for each lab assignment. A mean score for the three lab as-

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signments was calculated for each student. This data was entered into Microsoft SPSS 19® in order to explore a possible correlation between students' mean lab scores and the percentage of total number of hits with the professor-created videos.

Table 4: Students' Lab Mean Lab Scores

ID	Lab 1 Score	Lab 2 Score	Lab 3 Score	Lab Mean Score
1	100	65	76	80
2	100	90	86	92
3	100	97	93	96
4	100	94	100	98
5	100	71	93	88
6	100	93	100	99
7	100	95	96	97
8	100	100	100	100
9	100	97	0	66
10	100	100	0	67
11	100	75	0	58
12	100	98	84	94
13	100	74	82	85
14	100	100	100	100
15	100	97	95	97
16	100	93	89	94
17	0	0	0	0
18	0	0	0	0
19	100	93	96	96
20	100	91	74	88

At the time of this study, the author was unable to obtain data related to the cumulative time spent viewing all videos or the time usage data associated with the viewing of each individual video. It is hoped that as a part of this ongoing research, this time usage data can be extracted and analyzed.

4. RESULTS

Based upon the students' usage statistics generated with the "All User Activity Inside Content Areas" report in Blackboard, the total number of hits for all videos during the specified time period was 412. The percentage of individual students accessing at least one video was 80% or 16 out 20. The total number of hits by individual student for the same time period is presented in descending order below in Table 5, along with the percentage of hits by an individual student in relation to the total number of hits.

A breakdown for number of hits by individual students within a specific range was calculated (see Table 6). As presented in Table 6, the least number of hits by an individual student was 0, while the greatest number of hits by an individual student was 85. The average number of hits by all students was approximately 20.

Table 5: Summary of Usage Statistics

ID	Number of Hits by Individual Student	Percentage Related to Total Number of Hits for All Videos
1	85	21%
2	61	15%
3	55	13%
4	43	10%
5	38	9%
6	26	6%
7	17	4%
8	14	3%
9	12	3%
10	12	3%
11	11	3%
12	11	3%
13	10	2%
14	9	2%
15	4	1%
16	4	1%
17	0	0%
18	0	0%
19	0	0%
20	0	0%
Totals	412	100%

One student accounted for approximately 21% of the total number of hits for all videos (85 out of 412) and five students accounted for 68% of the total number of hits for all videos (282 out of 412).

Table 6: Summary of Number of Students within Range of Hits

Range of Hits	Number of students
0-5	6
6-10	2
11-15	5
16-20	1
21-25	0
26-30	1
31-35	0
36-40	1
41-45	1
46-50	0
51-55	1
56-60	0
61-65	1
66-70	0

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71-75	0
76-80	0
81-85	1
Totals	20

With respect to students' mean lab scores and the percentage of total number of hits with the professor-created videos, a linear relationship was not present so normality of data could not be assumed. Therefore, data was analyzed using a Spearman's correlation analysis. Students 17 and 18 were outliers (as shown in Table 4), so their data was not included in the statistical data analysis. Based upon the results of this analysis, a very weak, negative correlation was shown between students' mean lab scores and the percentage of total number of hits with the professor-created videos (r_S=-.006, n=18, p=.98).

5. DISCUSSION AND CONCLUSION

The author has incorporated professor-created video demonstrations as a learning resource in multiple courses over the past two years and has received positive feedback on student evaluations of instruction during this time with regard to the videos. Consequently, the aggregate and individual students' usage statistics of this particular course was a bit disheartening. The data showed that a large percentage of video usage, almost 70%, was related to a very small number of students, namely five. Recording, editing, and previewing videos requires a great investment of time and effort from the professor and begs the question as to whether this time and effort produces desired results or could be used in other potentially more productive activities to assist students' learning in online courses.

An obvious limitation of this study was the fact that time usage data was not available during the time period of the students' usage analysis. Consequently, the overall time spent viewing all videos by all students and the time spent viewing an individual video by an individual student is unknown. This could potentially be significant in that it might be found that a student had a large number of individual video hits, but spent little time viewing each video.

Finally, this sample size for this study is smaller than the recommended size for correlational analyses (David, 2009) and was limited to data collected from the first three weeks of course delivery. Perhaps an expanded study consisting of a larger number of students over the span of the entire 10-week course would yield more promising usage statistics.

In light of the results of this preliminary study, perhaps it is as Sharp and Schultz (2013) suggested: the incorporation of professor-created videos into an online course has the potential to help students make a connection with the professor, obtain the necessary knowledge to master course concepts, and provide additional support when the textbook is lacking. However, more research is necessary to determine the cost-benefit of the professor's time and energy invested into the creation of the such videos.

For future research, it would be interesting to extract and analyze the actual time usage data to correlate the total number of hits with the total time spent viewing professor-created videos, in addition to examining the actual amount of time students viewed each individual video each time they hit the video link. This could also lead to exploring the effect this data may have on students' performance with related lab assignments and exams.

Certainly, online education is not going away any time soon, particularly as online course and program offerings continue to grow and become more competitive. The study of professor-created videos, as well as other instructional technologies, needs to be ongoing as institutes of higher education grapple with the quality of online instruction and the need to enhance students' learning. It is strongly recommended that attention is also given to the time and effort required to develop this type of course content effectively.

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