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Adoption of Asynchronous Learning Tools by Traditional Full-Time Students: A Pilot Study

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Abstract. Comparing the performance of distance learning and on-campus students is a well-studied problem. Results have shown that distance learners can perform as well or better than on-campus students. Few studies, however, have explored how or why traditional on-campus students utilize the technology intended for distance learners. Many universities and corporations provide educational and training content simultaneously to both face-to-face and distance students. Thus, exploring how instructional technology typically designed for distance learning students could benefit traditional students is important to our understanding of present and future learning environments. To this end, a pilot study was undertaken that explored how graduate students – primarily business majors – adopted and used video-streaming technology for a one semester course on Knowledge Management Tools and Techniques. Results indicated that age, previous use of the technology, need for interaction and Internet connectivity all influenced the decisions of the subjects to adopt the technology. Two-thirds of the subjects used the technology, with a self-reported estimate of procuring 16% of the course content asynchronously. Most used video streaming for convenience reasons and to review class material.

Keywords: asynchronous learning, video-streaming, distance learning, traditional students

1. Introduction

The relative efficacy of distance-learning classes as compared to traditional face to face classes has been a well-studied problem [2]. In general, results have shown that students at remote sites have performed as well, if not better, than students taught in a traditional classroom setting [12].

Technological platforms for distance learning continue to change [1]. Many universities and corporations are exploring the use of asynchronous technology over the Internet for providing educational and training content [6]. Asynchronous learning implies allowing students to access course material "on demand", irrespective of time and place. Thus, educational delivery systems can be classified along two dimensions: time (synchronous or asynchronous) and place (face-to-face or at a distance). As with traditional distance learning settings, early evidence indicates that asynchronous learning can provide as good or better platform for learning than traditional classrooms [8,11].

Video streaming is one technology that can be used to facilitate asynchronous, Internet-based course content. Video streaming technology allows the viewing of large video and audio files on the Internet over relatively slow connections by utilizing highly

compressed files and intelligent buffering at the receiving site. Thus, a student (equipped with a free plug-in) can watch course content from home at their convenience through his/her Internet browser, seeing and hearing their professor while simultaneously viewing class notes and overheads.

Although the aforementioned studies have compared learning at a distance to face-to-face learning environments (in both time dimensions), we could find no studies that specifically explored how (or if) students in traditional classroom settings adopt and use tools primarily designed for distance learners. Therefore, this paper reports the results of a pilot study that assesses traditional same time, same place student usage of an asynchronous tool (video streaming) primarily designed for distance learning students in their course experience. As many schools and corporate training departments move toward multi-mode content delivery, understanding the dynamics of how technological tools influence each student learner is critical.

Since this is an exploratory study, generalization of results may be low. Nonetheless, our findings provide direction for future research studies as educators continue to continuously monitor and assess new content providing technologies. Assessment of results linked to nontraditional course delivery is extremely important for schools of business for a number of reasons. Such reasons include justification of capital and cost investments in instructional technologies, satisfaction of accreditation agencies (e.g., AACSB) regarding distance learning student's quality, and faculty satisfaction.

2. Background

2.1. Brief literature review: distance and asynchronous learning

Student performance in distance-learning classes as compared to traditional face to face classes has been well studied [2]. In general, results indicate that students at remote sites have performed as well, if not better, than their traditionally taught counterparts [8,11]. Additional studies have investigated other learning outcomes as the dependent variable [10], student personality as it relates to distance learning success [2], and other tangentially related topics.

Distance learning technologies have dramatically evolved over time. From the "old days" of videotape, to one-way broadcasts via satellite, to two-way interactive compressed video, to real-time video over the Internet, we have found new and exciting ways to reach distance learners. Academia no longer considers the question "Do we get involved with distance learning?", but now seeks to find "What is the best approach to the multi-site, multi-media learning environment?" (i.e., the so-called true student-centered learning model of Garrison [4]).

This question can be captured in the following quote from Steven Gilbert, Director of Technology Projects for the American Association for Higher Education.

> We are likely to discover that, for some kinds of learning and communication, face-to-face discussion is absolutely essential. For others, it may be more effective for

> most people to learn on their own, from books or interactive CD-ROM's. But I expect what we'll find that what is usually best is some mixture of conventional instructional materials, new applications, independent work, telecommunications, and various pedagogical approaches – matched against different individual abilities and the needs of students and faculty [5, p. 14].

Asynchronous tools facilitating distance learning have captured the interest of academics and corporate trainers alike. Although not as well studied as synchronous distance learning, anecdotal and initial empirical studies indicate that asynchronous learners can perform as well (or better) than traditional learners. Perhaps the biggest concern raised about asynchronous learning is the seeming elimination of peer and faculty interaction, normally thought to be critical for learners.

Mayadas [7], however, asserts that asynchronous learning actually fosters a very high degree of interaction among students and instructors, independent of time or place. Course material can be distributed using a variety of technologies, including the Internet, videotape and CD-ROM. Options to support discussion and interaction between the instructor and learner include electronic mail, listservs, online bulletin boards, and other conferencing systems. Thus, "convenient" interaction is fostered to alleviate the logistic challenges faced by, for example, professionally employed part-time graduate students.

Additionally, Miller and Webster [8] studied the interaction needs and performance of distance learners in asynchronous and synchronous classes at Iowa State University. Among other findings, their study found no significant differences in the interaction needs expressed by learners receiving different modes of instruction, nor was there any significant difference between the asynchronous and synchronous student grade distributions.

A recent study using students in a graduate level telecommunications systems class examined the usage of video streaming to obtain course content over the Internet [11]. Results indicated that 83% of the students were "comfortable" with the technology, 90% felt that the ability to review portions of the lecture was essential or very useful, and only 12% indicated they preferred the traditional classroom structure to a mixed-mode format of Internet and distance learning content. Additionally, 23% of the students indicated that they preferred asynchronous course delivery, while 58% posit that the technology is best used in conjunction with real-time instruction.

As much time, effort and money continues to be spent on distance learning endeavors in business schools around the country, little attention has been placed on the potential impact of the technological tools used to support distance learning on the local, face-to-face "traditional" student. Beyond the use of e-mail, overhead slides on the Web and groupware packages [1], advances such as video streamed lectures may also offer significant benefits to the "traditional" on-campus students as well as their "remote" colleagues.

To date, few, if any, have studied how and why on-campus students choose to adopt asynchronous technology during their class experience. There is a certain element of faculty who fear that Web-based instruction will cause massive instructor obsolescence.

They feel that if a "tape" can be made of the instructor and played by the students "on-demand", this will reduce the need for faculty. Do students quit coming to class when this asynchronous mode of learning is available, especially if they find faculty less than entertaining? Do they use the technology to support their own laziness, or do they use it to assist their learning process? Or do they just ignore the possibilities of the tools? These questions about this alternative content transmission system, among others, are explored in this pilot study.

2.2. Video streaming

The most common way to view binary data over the Internet is to copy a file from a remote server by either FTP or utilizing a save function on one's Web browser and copying it to the local hard drive. Rich media, such as video files, can be very large. For example, a 5 min, small dimension, digitized video could result in a 4.1 Gigabit file. This file, uncompressed, could take almost 3 days to download with a 28.8 K modem. With a lower quality image and compression, this can be reasonably lowered to about 5–15 min – still too long to expect the average recipient to wait before the beginning of a 5 min presentation.

Video streaming technologies make the viewing of rich media much more feasible over relatively slow connections. Digitized video is highly compressed prior to being placed on the video server. A browser plug-in on the client side plays the video with the help of a local buffer. The buffer is filled up and when it has sufficient data, the video begins to play from the buffer while additional segments are continuously retrieved from the server. The result is a relatively good audio and video over a 28.8 K connection with only a few seconds delay.

To create course content using video streaming, the following process is typically followed. Course material is recorded on tape (instructor talking, computer output, notes, etc.), then converted (captured) to an .AVI file. Using a video production product, highly compressed video and audio files are then created. Handwritten lecture notes can be digitized and overhead slides captured as well. Then, in the production phase, a timeline function is used to link the video, audio and notes together to create the end product. The final Web page seen by the student includes a small "talking head" in the upper left corner of the screen, a content outline below the image (a table of contents), and the largest portion of the screen, the right-hand side, devoted to showing the relevant slides or scanned notes.

At the time of this study, graduate students on assistantships were in charge of video compression, post-production of the video, etc. The variable cost per class was approximately $400–500 per class (graduate students are cheap labor). The one-time cost for equipment/hardware was approximately $3000–4000. The streaming production has since been outsourced to another group on campus, which charges $1000 per course. Although a higher cost, this arrangement limits the headaches for the supervisor of the graduate students and frees that resource for other pursuits. In either approach, the impact on the faculty member was minimal (or zero, if he/she was already accus-

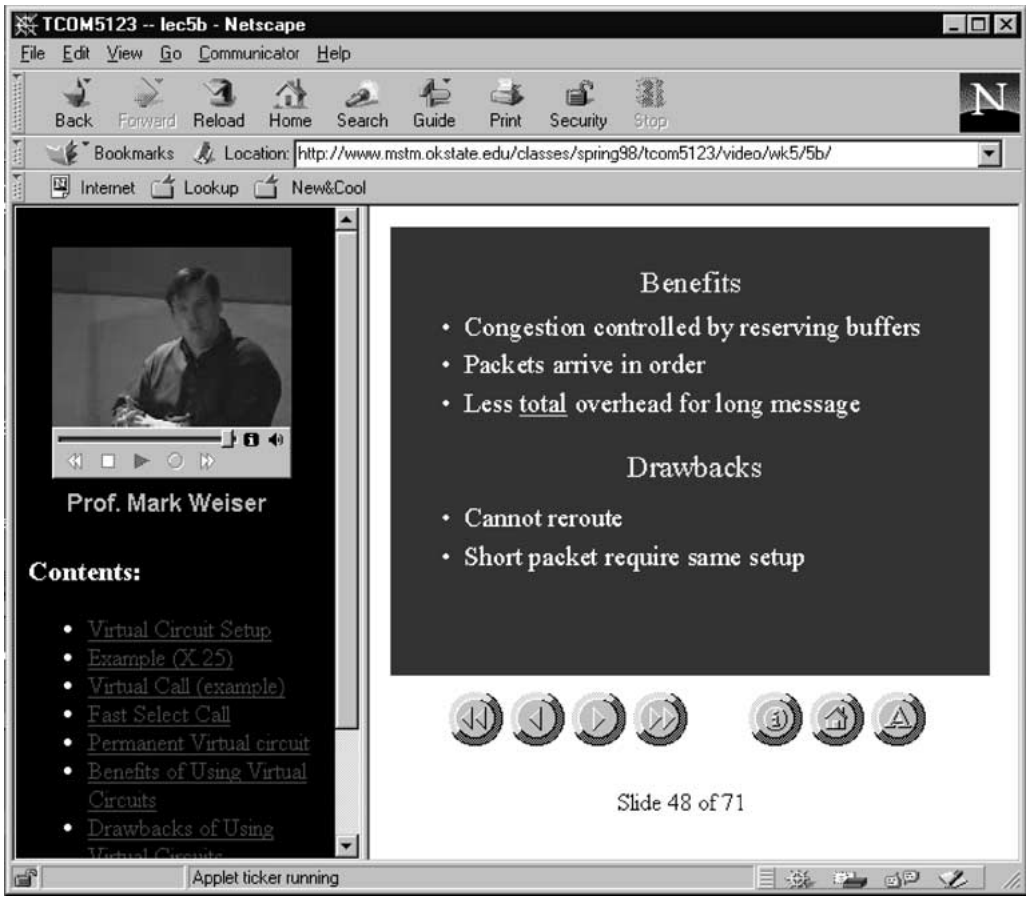

Figure 1. An example from a video streamed lecture viewed in Netscape. Note the ability a user has on the left-hand side to go directly to a topic of the students choice as well as the ability to use the scroll bar to move back and forth in the lecture.

tomed to placing power point slides on the Internet). More details about the specific implementation of video streaming can be found in [11].

Figure 1 shows an example screen. Note that a typical implementation of video streamed content provides a table of contents feature so that a student can navigate to specific lecture points throughout the entire lecture without having to wait for the entire file to download. Thus, students can "replay" specific class topics without having to listen to other portions of the lecture.

2.3. Model of asynchronous tool use

Past research has posited that there are four categories of influence on distance learning outcomes: technology, instructor, course and student characteristics, e.g., [10]. We use

these four categories to provide a framework for our pilot study and other future efforts to examine how or why on-campus students adopt asynchronous tools.

- *Technology*. It has been hypothesized that reliability, quality and medium richness are key influences on learning outcomes. In this study, the technology is fixed: asynchronous video streaming use is studied. The Technology Acceptance Model (TAM) of Davis [3] is relevant in viewing technology adoption. Simply stated, TAM identified that past experience with the technology would positively influence a subject's continued use of the technology if they had positive previous experiences, and negative experiences would have the opposite effect.
- *Instructor*. The relevant aspects of teaching that might influence the student's use of asynchronous technology in this study are ability and style. Ability could relate to the perceived amount of value-added content provided to the student by the instructor in real time. A more negative view of ability would hypothesize that, if the instructor was not particularly good, or added little to the class other than reading overhead slides, the student might be motivated to use asynchronous technologies to "replace" the instructor.

  Instructor style, in our context, relates to the desire to facilitate class discussion in class. A highly lecture oriented class (little discussion, mainly content delivery) would seem to be more conducive for asynchronous content delivery. Obviously, if the instructor provides grade motivation for facilitating classroom discussion (and does not do the same for electronic-based discussion), this would tremendously inhibit student motivation to use the tools.
- *Course*. In the context of our study, course characteristics would be content related and would have a fair amount of overlap with instructor style. One might speculate that technical classes would have higher usage of the asynchronous content tool for review than more managerial classes, due to inherent difficulty in digesting technical course material. Likewise, one could stereotype more technical classes as more lecture oriented, thus also leading to a more favorable climate for adoption of the asynchronous technology. Nonetheless, the combination of the instructor and course characteristics will impact the decision made by the learner whether or not to use the technology. For our pilot study, since a single class is examined, both the course and faculty characteristics are fixed.
- *Student*. Demographics and past experience with the technology may play a role in the adoption of the video streaming technology. Additionally, individual student learning styles, particular life characteristics and access to the necessary technical resources will all play a role in their adoption of the technology.

To summarize, these four specific characteristics are hypothesized to influence the decision or choice to use the technology to assist their learning process. Following the adoption of the technology, the use of the technology would then influence the performance and/or satisfaction in the class (outcome variables). Again, in this study we are not focusing on outcome variables per se, but with the decision to use and the resulting satisfaction of the distance learning technology.

3. Methods

Subjects for this pilot study were a convenience sample (i.e., they were students in one of the author's classes at a southwestern U.S. university). The class was a graduate elective in Knowledge Management Tools and Techniques (primarily applied artificial intelligence topics such as expert systems, case-based reasoning, neural networks, etc.). Students taking the class were all graduate students and were either MBA's, M.S. in Telecommunication Management students or classified as "others". Most of the "others" were M.S. in Industrial Engineering students.

Students enrolled in the class had no prior notice that their streaming use would be examined. Thus, their main motivation for enrolling in the class was based on content (and perhaps class availability). Homework was assigned most weeks, and could be turned in electronically or in person. Attendance was not part of the overall grade and was taken only to help the instructor learn student names. No effort was made to influence the students to attend class, skip class, etc. Students were told during the first class period that the video streamed class content would be available for their use as desired.

The class had 45 on-campus students who met for 2 h and 45 min each Thursday night. The classroom had video and computer screen capabilities, thus content was easily video taped. The video tape, class notes, and overhead slides (which were available before class on the class home page) were collected and a video streamed version of the class was typically available to students by Monday afternoon of the next week. The instructor primarily communicated between classes through e-mail and held traditional office hours, but did not employ other web-based discussion formats.

Since there was a mix of technical and non-technical students, the faculty member aimed to provide a balanced view of knowledge management tools during the semester. Also, because of his style and the type of content, most of the course was pure lecture. Interaction that did take place was typically in Q & A sessions on difficult technical concepts.

The faculty member teaching the class was experienced in using the classroom, had been teaching the content of the class for 8 years, and had performed research in the area. Additionally, the instructor has won a number of teaching awards and thus could be legitimately classified as being at least "above average".

Students in the class were, with 2 exceptions, traditional full-time students. The two students who were not full-time were not included in the analysis. All full-time students lived in close proximity of campus and thus could be considered to be homogeneous in terms of their accessibility to campus-provided technology for viewing video streaming. Of course, many also had modem capability of at least 28.8 K at their residences.

Thus, a number of possible factors that could influence the adoption decision of the on-campus students were fixed in our pilot study. By choosing a mature technology, a good face-to-face instructor and a single class with a predictable environment, our study allowed us to narrow the focus appropriately as we attempted to gain some initial understanding about the potential variables involved in the on-campus adoption of distance

learning tools. Our pilot study is limited in generalizability, but it allows us to keep the scope of variables reasonable for an initial investigation in this area.

A questionnaire was provided at the end of the semester to each student. It was a simple instrument designed to gain demographic information (age, gender, degree program), information about previous use and exposure to the video streaming technology (Yes or No), and the percentage of the course content that was "watched" using video streaming. Subjects were also asked, on a 1–5 Likert scale, their opinion on whether they thought the class had a managerial emphasis (1), a very technical emphasis (5), or somewhere in between. Likewise, a similar question was asked regarding class format, anchored with the responses "lecture only" (1) through "discussion only" (5).

Subjects were then asked, using the same 1–5 Likert scale, their opinion on the impact of video streaming on the quality of the course. A response of 1 implied reduced quality, 3 indicated no impact, while a 5 was indicative of significant quality increase. If the subjects did not use video streaming, their response to this question was meaningless.

Two sets of questions were then posed to the subjects (again, on a 1–5 scale). These questions covered reasons why they used video streaming (which were only answered and tabulated for those who did use the tool) and reasons why they did not (or might not) use video streaming. The left-most column of table 1 shows the questions.

The questionnaire was handed out to the students at the end of the semester, at the same time as course evaluations. Total anonymity was insured (i.e., no attempt was made to work backward from the data and determine class grades as a performance variable). Our prime goal was to gain insight into the underlying variables that may explain why and how some students chose to use the technology. We would hope that the stability of the video streaming technology used in the class would also lead subjects who used video streaming to respond with no worse than a "no impact" regarding course quality. As accepted in the IT literature, we will use this measure of "satisfaction" to imply that use positively impacts performance.

4. Results and discussion

Forty-two subjects (students) returned questionnaires, 36 of which were usable. Reasons for non-inclusion were missing data and two responses from subjects whom did not meet the "full-time" student criteria. Table 1 provides a summary of responses. The first column of numerical data provides averages and standard deviations for those subjects who used video streaming (24 of the 36, or 66.6%), while the second column shows the calculations for those subjects who did not utilize the technology. Again, note that the non-users of the video streaming technology did not respond to the questions "Why Use Video Streaming?" Likewise, this group would also not respond to assessing the impact of video streaming on the course quality. In both cases, if the subject did respond, the data was not included in analysis. Both groups had similar assessments that the course content was fairly balanced between managerial and technical (3.28 video streaming users compared to 3.37 for the non-users). Likewise, both groups viewed the class format

Table 1
Questionnaire results (and statistical significance) from the users and non-users of videostreaming.

	Video streaming users $n = 24$		Video streaming non-users $n = 12$		Significance
	average	s.d.	average	s.d.	
Age	26.1	4.8	31.1	8.7	[a]
Gender (M = male, F = female)	6 F, 18 M		3 F, 9 M		
Degree (MBA, MSTM, Other)	9 MSTM, 8 MBA, 7 Other		3 MSTM, 7 MBA, 3 Other		
Videostreaming use before?	13 Yes, 11 No		1 Yes, 11 No		
Impact (1 = reduced quality, 5 = increased quality)	3.9	0.9	N/A		
Percentage used for content	16.10%	11.0	N/A		
Why used video streaming?					
Travel requirements of job	2.04	1.6			
Subject matter does not require interaction	2.00	1.2			
Convenience	3.88	1.4			
Course is straightforward	2.29	1.4			
I don't value class interaction highly	1.83	1.2			
Review for exams and homework	3.67	1.4			
Review specific unclear points in the lecture	3.83	1.3			
Why did you not use video streaming?					
Guilt on skipping class	2.71	1.7	1.75	1.2	[a]
Need class interaction for learning	2.96	1.6	4.25	1.0	[b]
Need camaraderie of classmates	2.58	1.5	2.25	1.4	
Habit of attending classes in person	3.71	1.5	4.16	0.8	
Course material "requires" you to be in person	2.54	1.4	2.75	1.4	
Attendance is expected by faculty	1.92	1.2	2.33	1.0	
Classtime is convenient	3.00	1.6	3.00	1.5	
Inconvenience of Internet connectivity	2.67	1.8	3.58	1.6	[b]

[a] $p < 0.1$.
[b] $p < 0.05$.

as primarily lecture-oriented (2.2 average for the streaming users and 1.9 for the non-users, which was not a significant difference).

Note that the average usage of the video streaming for content was approximately 1/6th (16.1%) of the total content. For a normal 15-week semester, that is approximately

between 2 and 3 weeks worth of classes. Age was significantly different at the ($p < 0.1$) between the two groups – the younger students used the video streaming more than the older students. This would be in line with conventional wisdom (or perhaps stereotypical thinking) that younger people are more inclined to try new technologies or be more familiar and less fearful of the technology. Of course the difference in the ages, while statistically significant, was not of a large magnitude (such as a generational sized gap).

Each group had exactly the same proportion of females (25%). Distribution of specific degree candidates is a little skewed, but hard to measure. It is worth noting that many of the M.S. in Telecommunications Management (MSTM) core classes are video streamed, thus the true variable of interest may not be degree, but whether students had previous exposure to video streaming. Table 1 notes that all but one student with prior video streaming experience was a "user". Thus, there is evidence that having a stable video streaming technology in use at this university may be a critical component to the adoption of the technology.

The impact on course quality showed that, in general, students felt that video streaming was a value-added process (3.9 average out of 5). Interestingly, 2 respondents found that the video streaming reduced the quality of the class (a score of "2" on the five point scale). This is especially interesting since the students all had easy accessibility to same time, same place content delivery and that they chose streaming under their own volition.

Convenience, review for exams, and unclear lecture points were identified as major reasons why video streaming was used. Thus, as anecdotal wisdom has indicated, the "safety net" function of video streaming appears to be the most prevalent reason for on-campus student usage of video streaming. Perhaps the approximate 2–3 weeks of content is accessed during critical times of the semester when mid-terms are going on, or for the inevitable evenings when sitting in a class is not high on the priority list of the fairly young graduate student (especially Thursday nights!). It is a different kind of "convenience" that attracts non-traditional distance learners to the technology, as many of them have hectic travel schedules or logistic problems that the convenience of video streaming (and other technologies) helps them overcome.

Interestingly, respondents stated that their use of video streaming was not due to the subject requiring little interaction in the class (recall that all agreed the class was primarily "lecture based"), nor did the users identify that they did not value class interaction highly. Perhaps the class material was new to most students and that the "ad-lib" Q & A sessions that took place were found to be valuable and hard to duplicate on streaming video.

The second set of questions asked of the subjects focused on "Why did you (or would you) NOT use video streaming". Three of these questions had significant differences between the adopters and non-adopters of the technology: guilt on skipping class, need class interaction for learning, and inconvenience of internet connectivity.

It is extremely interesting to note that those who used the technology indicated they possessed higher guilt for skipping class than did those who did not use video streaming

at all. Thus, those who did use the technology were troubled by the fact that they may have missed class. At first glance, this response is opposite of expectations.

Possible explanations of this result include the following. Perhaps those who use video streaming are the students most committed to working the hardest on mastering course material and may be using the streaming in addition to attending class. Also, these "best" students may take a portfolio view of their semester, trying not just to maximize their grade for an individual class, but for their overall "portfolio" of classes. Thus, at critical junctures in other classes, these "optimizing" students might skip a class section to focus on another subject (and harboring grave guilt for missing class!), then get caught up in the class they skipped by reviewing the video streamed lecture.

Anyway, our reticence to collect information such as past GPA, present performance in class or in other classes may confound these results. Future data collection for on-going assessment of the technology may need to include more difficult to capture and less politically correct "performance" indicators.

The need for class interaction is different between the groups, much higher for those who did not use video streaming. This appears consistent with the postulation that learning style and other personality characteristics may determine the likelihood and perceived benefits of the technology to the individual, which thus directs the adoption decision.

Finally, the non-user group indicated they had more inconvenience with Internet connectivity than did the group that utilized video streaming. This is an interesting finding since the subjects were fairly homogenous, and it is easy to assume that their access to video streaming technology (PC's, bandwidth) would be equal (say through the use of university computer labs). In retrospect, this may not be true due to the inevitable overcrowding that takes place in campus labs, and the potential inability to concentrate on audio in such conditions. Thus, if home use (or middle of the night use) is how traditional students would try to utilize the technology, video streaming ease of use again becomes contingent on ISP availability, good wiring (always a challenge in student housing), etc.

A regression model was analyzed to explore how usage was predicted using the collected variables. The dependent variable was coded as 0/1, 1 indicating that the subject used video streaming. Pertinent demographic information was included, as was data related to "Why did (or would) you not use video streaming?" as independent variables. Table 2 gives the regression statistics of the best model. Note that the model variables which are significant mirror the discussion above in impact and direction (as it should).

The model also has a high degree of predictive validity in classifying subjects into streaming users and non-users. The model correctly classifies 22 of the 24 streaming users (91% correct) and 9 of the 12 non-user (75%). Thus, from our pilot study, evidence indicates that age, "guilt", technology accessibility and learning style (class interaction) are variables that potentially explain the adoption of asynchronous content delivery by traditional on-campus students.

Table 2
Regression statistics for the "best" model relating the use of videostreaming and questionnaire responses.

Regression statistics	
Multiple R	0.72294
R square	0.52265
Adjusted R square	0.44309
Standard error	0.35678
Observations	36.00000

ANOVA

	df	SS	MS	F	p-value
Regression	5.00000	4.18118	0.83624	6.56932	0.00031
Residual	30.00000	3.81882	0.12729		
Total	35.00000	8.00000			

	Coefficient	Standard error	t stat	P-value
Intercept	1.79904	0.34534	5.20949	0.00001
Age	−0.02076	0.00957	−2.17049	0.03801
Guilt	0.12641	0.04210	3.00255	0.00536
Class interaction	−0.16720	0.04336	−3.85625	0.00057
Attendance	−0.03288	0.06002	−0.54790	0.58782
Internet	−0.07514	0.04304	−1.74587	0.09107

5. Summary and conclusion

This paper presents a pilot study undertaken in a fixed environmental classroom setting that begins to explore how "distance learning technologies" can also aid the traditional face-to-face student. Our results appear to support that, absent of significant technological roadblocks, individual characteristics will determine the adoptability and potential success of new content delivery mechanisms *when students have alternatives*. Traditional distance learning students have a totally different set of characteristics (travel schedule, distance to and from work, distance to and from the distance learning studio) that are not typically relevant to on-campus students.

The challenge for the future in education will be in developing delivery mechanisms where all students can be successful. Most universities for financial reasons are moving toward classroom environments that have both on-campus and distance learning students simultaneously enrolled in classes. Each student learns best in unique ways. Thus, to satisfy this, the inclusion of "new" technologies should be considered for all students, not just the distance learners.

All studies have limitations. Our pilot study, with a convenience sample, experienced instructor, lecture-oriented class, moderately technical class, and use of a mature technology, may not generalize well. Nonetheless, the study makes an important contribution in the validation (in this environment) that learning styles (encapsulated in "need for interaction"), technology access ("Internet") and other learner characteristics

(previous exposure to the technology, age, perhaps student commitment) are relevant in adoption decisions of content delivery systems. Future studies should follow-up exploring the impacts of other variables we chose to fix in our study. Further enhancement and continuation of this line of inquiry could also lead into the development of an advising or screening tool for distance learners. As more insight is gained into the variables and factors that predict successful use of non-traditional content delivery systems, guidance could be provided to new degree applicants who are considering the use of distance learning tools.

Finally, assessment of learning and learning outcomes is an integral component of continuous improvement that all universities and colleges of business should be practicing. For example, consider the emphasis that the AACSB places on assessment. As increased demands are placed on higher education to be more responsive to industry partners in providing content "on-demand", tools that will ensure academic quality and assessment are needed to provide feedback and reinforcement to faculty involved in distance learning. Many exciting challenges and opportunities face those providing content now and into the future, and an increased understanding of the impacts of distance learning technology on all students furthers our ability to develop the leaders of tomorrow in our classrooms.

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