A TEST OF INTEGRITY: REMOTE PROCTORING IN AN ONLINE CLASS

L. F. Cochran, Assoc. Professor of Management, lcochran@atu.edu
L. K. Troboy, Professor of Management Information Systems, ktroboy@atu.edu
T. L. Cole, Asst. Professor of Legal Studies, tcole7@atu.edu

Arkansas Tech University
Russellville, AR, 72801
1-479-968-0354

Abstract

Online education has become a major force in higher education. Both the number of students taking online courses and the number of courses offered as grown at a double digit rate. As this nontraditional means of course delivery has grown and developed, however, faculty members have discovered new challenges to ensuring academic integrity. Faculty have been reluctant to adopt online courses without some assurance of honesty by the course participants. In response to this concern, new technologies are emerging to verify the identities of online course participants and to reduce the opportunities for academic dishonesty. This study was conducted to examine the feasibility and impact of one such technological solution, the SoftwareSecure System, in an online business course. The system was evaluated and student feedback was collected to determine what influence a 360 degree camera recording would have on the testing environment. Challenges to the delivery of the system are discussed.

Introduction and Literature Review

The number of universities offering online courses continues to grow. Growth in online course offerings is phenomenal, with some research indicating that over 4.6 million students were enrolled in at least one online course in the fall 2008 term (Allen and Seaman 2010). This represented a 17 percent increase over the previous fall. The overall higher education population grew at a rate of only 1.2 percent for the same time period. Allen and Seaman also found that online enrollment represents approximately 25 percent of total enrollment, up from 22 percent the previous year and from 10 percent in 2002.

The era of online education has ushered in a host of concerns that educators around the globe are working to address. One major concern is academic integrity. In a study from the fall of 2009, only 31 percent of faculty agreed with the statement that their faculty accept the "value and legitimacy" of online education (Allen and Seaman 2010, 12). Who is actually taking the course and whether they are taking exams without benefit of unauthorized resources are questions that are frequently asked. Even if instructors assume that students are using the textbook during exams, what about other resources not allowed by in-class students, such as cell phones, Google searches, the Wolfram Alpha answer engine, and additional notes?

To ignore the potential for cheating in online classes is shortsighted. Whitley (1998) found that over 70 percent of college students reported cheating during their postsecondary education.

Students cheat in order to get ahead (Simkin and McLeod 2010). Online classes, by their very nature, facilitate this behavior in that usually no one is actively watching the student (Whitley 1998).

Several studies have shown the benefits of in-class proctored exams. Benefits include improved performance on the post-test measures and more time spent taking the test (Wellman 2005; Alexander et al. 2001). These studies were based on in-class proctored online exams. Systems like Respondus, a lockdown browser, address a portion of the problem. Lockdown browsers prevent the user from accessing the internet or other programs on his or her computer while taking the assessment. Lockdown browsers also prevent the student from copying exam questions to pass on to other students. This prevents some access to other resources during online exams but still does not control for unauthorized help, such as the "group exam" or cell phone use which are available in unproctored settings.

Proctoring exams for students enrolled in online courses is problematic. Some faculty have used the hybrid or blended approach to force students to attend a face-to-face class for proctored exams while others have required online students to find a proctoring service, typically a nearby university testing center or commercial certification location (Hill 2010). These approaches which can be costly to the student are not always practical, particularly in a degree program which is offered completely online and enrolls students from a widely-dispersed geographic area.

Kryterion, while not selected for this trial, is an example of remote proctoring software (Lorenzetti 2009). Instead of using a fingerprint, Kryterion uses keystroke analytics to examine the typing pattern of the respondent. In addition, it uses a webcam that captures the actions of the respondent in a limited view. WebAssessor is another example of the camera/typing style approach. It is another proctoring system which uses webcams and software that evaluates students' typing characteristics, including speed and pausing habits (Howell et al. 2010).

Troy University (2008) implemented a technology-based remote university-wide proctor system from SoftwareSecure in online courses for the express purpose of enhancing academic integrity and the value of their degrees. Dune, Meine, And McCarley (2010) argued that this strategy is a pedagogically and philosophically sound approach. Launched in 2007, the Secureexam Remote Proctor System has been used by a number of schools, including Florida Institute of Technology and the University of West Alabama (SoftwareSecure 2010a, b; Kopf 2007, Troy University 2008; Troy University 2010). SoftwareSecure is a combination of browser lockdown product and remote proctor camera that allows for the desktop to be locked down within Blackboard. In addition, it authenticates the student by fingerprint and takes a picture of the student during setup. It will also take a snapshot of the student prior to taking each exam. The 360-degree camera captures video and sound to provide a complete monitoring solution during the assessment. The video is watched with sound after the exam is completed. There is also a "suspicious events" algorithm that captures audiovisual clips of suspicious activity during the assessment and provides that as a separate recording.

Prince, Fulton, and Garsombke (2009) found that graduate students taking proctored exams had significantly lower scores than students taking unproctored exams in two studies of online courses. One study compared exam results for 47 students in courses with the same environment

(same instructor, course, course delivery system, and exam format). The other study compared exam results for 75 students in four online courses (including the course in the previous study) from different disciplines. These authors concluded that proctored exams were more effective in terms of rigorous assessment of learning. While students may have been somewhat flustered by the proctoring equipment or situation, all students were graduate students in online programs. These students were more mature and should have been comfortable with use of technology.

The primary focus of this program was to examine the impact of this type of technology on the testing experience. A 360-degree camera and microphone system along with a lockdown browser was used to monitor students while taking exams. Under these circumstances, the authors sought to determine what impact this technology had on students' test-taking behavior and performance. The desire is to see a reduction or elimination in cheating on tests including using cell phones, other individuals taking the exam, unauthorized books and notes, etc.

Methodology

In the first summer term of 2010, Arkansas Tech University embarked on a small trial of the combination of a secure browser and remote proctor for one online course. The product selected was delivered by SoftwareSecure. The participants were required to submit their home computer to an online test to ensure that it was compatible with the software and hardware needed for the proctor company. While internet broadband was not explicitly required, the online test required a high speed connection to complete.

Eight participants from a fifteen person, junior-level Operations Management course volunteered and had computers that qualified to take part in the remote-proctor study. One student dropped the course prior to the first exam, leaving a total of seven remote-proctor participants. One of the seven participants dropped after taking some exams with the system, but before final grades were assigned, leaving a total of six participants who completed the entire course.

A set of four exams was administered over a five-week course. The students were given one hour and twenty minutes to complete each exam, which consisted of fifty multiple choice questions. Given that the exams were online and remotely administered, the students were given a 48 hour window in which to take each exam. It was a one-chance-only event. In the case of one student, the Internet service provider dropped service to his location during the exam and the exam was reset for a second administration.

One limitation of the process is that popup windows are blocked by the lockdown browser. This can be problematic in Blackboard, as it requires a popup window to execute in order to go from question to question during the exam. To avoid this conflict, the exam must be deployed all at once, presenting all fifty questions on one "page" and then submitted all at one time. The difficultly is that the students are unable to "save" their work as they progress through the exam. If the exam fails at any time or the Internet connection fails at any time, all work is lost. Both audio and video are recorded during the exam and stored on the Software Secure servers. These were viewed after the fact by the professor of record for the course.

At the end of the course a short survey was administered to the participants in the course. Student satisfaction with the course and the remote-proctoring system were the root questions on the survey. All students were invited to complete the survey regardless of whether they participated in the remote-proctoring group. Students were asked if they participated in the remote proctor group. Twelve of the fourteen remaining students completed the survey, which included all seven of the remote proctor participants. The survey questions are found in Appendix A.

Findings

One of the seven participants found the camera to be a distraction while taking the exams. The remainder felt the cameras had no impact on their ability to take the exams.

Three participants felt that the distance learning course either distracted from or did not contribute to their learning. Four participants felt there was some or a significant contribution to their learning by participating in an online course. Two of the three participants who did not find benefit in the online course also responded that they did not wish to take an online course in the first place. Of the remaining students who did not participate in the remote proctoring experiment, all five felt that there was some or a significant contribution to their learning.

In general, two participants in the remote proctor group did not want to take an online course in the first place and did not want to take online courses in the future. The remaining 5 participants in the remote proctor group desired to take online courses now and in the future. All 5 of the non-remote proctor participants desired to take online courses now and in the future.

The grade distribution for the two groups is listed in Table 1. The grades for the remote proctor group did trend lower for than the non-participants. Also included is the grade distribution for the previous summer term for comparison. The average cumulative course grade was also higher for the non-participant group (263 vs. 230 for the remote participants). Details of the actual grades are in Table 2. However, because the sample size was very small, this difference was not tested for statistical significant. Given that the proctoring encompassed exams only, the average exam scores are given in Table 3 for both groups. Comments from the remote proctor participants are included in Table 4. "No" comments and those of non-participants were not included.

Table 1: Grade Distribution

Grade	Remote	Non-Remote	Previous Summer
A	1	2	3
B	0	1	2
C	1	2	6
D	1	1	9
F	3	1	1

Table 2: Total Course Points Distribution Detail

Grade	Remote	Non-Remote	Average for Remote	Average for Non-Remote	% difference from Non-Remote
A	337	339 328	337	333.5	101.0%
B		305 301		303	
C	256	287 258	256	272.5	93.9%
D	244	225	244	225	108.4%
F	211 184 148	62*	181	62	291.9%
Dropped	2 students	2 students			

*This student was dismissed from the course midterm due to academic dishonesty on homework.

Table 3: Average of Exam Scores for Each Student
Summer 2010 Course

Exam Grades Remote (n 6)	Exam Grades Non-Remote (n 8)
82.7	78.0
65.7	78.0
64.0	75.3
63.7	71.3
58.7	69.3
42.7	65.0
	58.0
	46.0
AVG: 62.9	AVG: 67.6

Table 4: Survey Comments

It worked wonderfully and I highly recommend it.
i didn't mind using it
The remote proctor camera seemed to give me a little test anxiety.
I live about an hour from campus and have taken as many online classes as possible. By using this camera I hope that they will offer more classes for people like me who have to work and go to school full time. Once the few problems were resolved the camera worked fine. It was easy to setup and use and was not a big distraction. Tech should have thought of this earlier if that is what kept teachers from offering online classes.

Discussion

As noted above, six of the seven remote proctor participants felt that the system had no impact on their exam-taking abilities, and three of the four participants who wrote comments on the survey indicated that they liked the system or at least were neutral about it. These results suggest that instructors can use this system to address concerns of academic integrity without compromising students' performance. In fact, students may find the convenience of taking the exam at home a very desirable aspect of the course if the alternative is driving to campus or to a testing center to take the exam at a restrictive time.

Although two of the remote proctor participants did not want to take online courses, including the online course involved in this study, the remaining five remote proctor participants wanted to take online courses in the future after having taken a course using the SoftwareSecure system. This finding indicates that use of the SoftwareSecure system will not discourage students from pursuing online education, at least for students who are already open to online course delivery.

One limitation of the SoftwareSecure system which was not addressed in this study is cost. The students in this remote proctor study were allowed to use both the software and the cameras free of charge. The only responsibilities born by the remote proctor participants were setting up the system on their own computers before beginning the course and returning the cameras afterward. The instructor informed the participants that the university would not release their grades unless the cameras were returned, and all seven returned the cameras in a timely manner. If the students had been required to bear the cost of using the software and purchasing a camera, some of them might have considered the SoftwareSecure system an impediment to their education or might not have used it at all. The cost to the student is approximately $200 for the equipment and $30 per semester for a subscription to the monitoring service. These factors, in turn, might discourage students from pursuing online courses, at least where the system will be used. The equipment can be authenticated to another student, so it is possible for the student to 'sell back' the equipment or the university could purchase equipment and lease or rent it to students for a reduced fee.

There are also institutional barriers to implementing this technology. SoftwareSecure charges an institutional subscription and a per-exam fee to record exams and tag suspicious visual or audio events. The instructor will also need time to review these recordings, even at high-speed playback. This drawback may not be significant in small classes but may be prohibitive in very large course sections.

Another concern, regardless of students' perceptions that the system does not impair their exam-taking abilities, is whether the system *actually does* impair students in taking online exams. As noted above, the average grade (based on points earned) was higher for students who did not use the system than for those who did. While many factors might explain this difference in performance, further study may be warranted to assess the impact of using the SoftwareSecure system.

Conclusion

Although this remote proctor study was very limited in scope, the findings suggest that the SoftwareSecure remote-proctoring system merits further study. Because it may provide a means of addressing issues of academic integrity without compromising students' performance, the system could prove to be an asset to institutions seeking to expand or improve their online course offerings. As the use of online education continues to grow, students, faculty, and employers will seek assurance that online programs deliver quality education. Tools such as SoftwareSecure may help colleges and universities to achieve this goal.

References

Allen, I. E., and J. Seaman. 2009. *Learning on Demand: Online Education in the United States*.

Alexander, M., Bartlett, J. E., Truell, A. C., and K. Ouwenga. 2001. "Testing in a Computer Technology Course: An Investigation of Equivalency in Performance Between Online and Paper and Pencil Methods." *Journal of Career and Technical Education 18* (1). Available at http://scholar.lib.vt.edu/ejournals/JCTE/v18n1/pdf/alexander.pdf .

Dunn, T. P., Meine, M. F., and J. McCarley. 2010. "The Remote Proctor: An Innovative Technological Solution for Online Course Integrity." *International Journal of Technology, Knowledge and Society 6* (1): 1-8. Retrieved from CSA: Sociological Abstracts database.

Hill, C. 2010. "A Chink in Our Armor: Can Technology Provide a True Online Proctored Exam?" In *Promoting Academic Integrity in Online Education, Special Report*: 15-17. Available at http://www.facultyfocus.com/free-report/promoting-academic-integrity-in-online-education/ (accessed May 7, 2010).

Howell, S.L., Sorensen, D., and H. R. Tippets. 2010. "The New News about Cheating for Distance Educators." In *Promoting Academic Integrity in Online Education, Special Report*: 5-8. Available at http://www.facultyfocus.com/free-report/promoting-academic-integrity-in-online-education/ (accessed May 7, 2010).

Kopf, David .2007. "Securexam 'Cheat-Proofs' Remote Test Taking." *Campus Technology*. Available at http://campustechnology.com/articles/2007/06/securexam-cheatproofs-remote-test-taking.aspx (published June 13, 2007; accessed Oct. 3, 2010).

Lorenzetti, J. P. 2009. "Remote Proctoring: Key to Secure Exam Administration?" *Distance Education 13* (23): 1-2.

Powers, E. 2006. "Proctor 2.0." *InsideHigherEd, News*. Available at http://www.insidehighered.com/news/2006/06/02/proctor (published June 6, 2006; accessed Sept. 20, 2010).

Prince, D. J., Fulton, R.A., and T. W. Garsombke. 2009. "Comparisons of Proctored Versus Non-Proctored Testing Strategies in Graduate Distance Education Curriculum." *Journal of College Teaching and Learning 6* (7): 51-62.

Simkin, M. G. and A. McLeod. 2010. "Why Do College Students Cheat?" *Journal of Business Ethics 94*: 441-453.

SoftwareSecure. 2010a. "Florida Institute of Technology: Making Testing More Convenient and Secure for Everyone." Available at http://www.softwaresecure.com/US/Case%20Study%20PDFs/Case%20Study_FIT.pdf (accessed Sept. 20, 2010).

SoftwareSecure. 2010b. "University of West Alabama: Changing the Way Testing is Done." Available at http://www.softwaresecure.com/US/Case%20Study%20PDFs/Case%20Study_UWA%20(1).pdf (accessed September 20, 2010).

Troy University. 2010. "SACS Reaffirmation of Accreditation, eCourse Redesign section." Available at http://sacs.troy.edu/reports/03-04-12.html (accessed Oct. 3, 2010).

Troy University. 2008. "Troy University Hosts Online Learning Colloquium in Dothan." Available at http://www.troy.edu/news/archives/2008/april/04162008_online_learning_colloquium.html (accessed Oct. 3, 2010).

Wellman, G. 2005. "Comparing Learning Style to Performance in On-line Teaching: Impact of Proctored v. Unproctored Testing." *Journal of Interactive Online Learning 4* (1): 20-39.

Whitley, B. 1988. "Factors Associated with Cheating Among College Students: A Review." *Research in Higher Education 39*: 235-274.

Appendix A

Survey Questions for Remote Proctoring Course

Instructions (as deployed as a Blackboard Survey)
Name: Operations Survey - Students
Description: This is a survey for students participating in the Operations Management Course with Remote Proctoring.
Instructions: Please answer all questions honestly and completely. Your input will help us make decisions on these types of programs.
Multiple Attempts: Not allowed. This Survey can only be taken once.
Force Completion: This Survey must be completed now.

Question 1
Please select the phrase that best describes you.
Response Choices
  Full-time student, 17-24 years old
  Part-time student, full-time job, 17-24 years old
  Part-time student, part-time job, 17-24 years old
  Full-time student, 25 or older
  Part-time student, full-time job, 25 or older
  Part-time student, part-time job, 25 or older

Question 2
What type of course was it?
Response Choices
  Primarily taught face-to-face in the classroom

Some classroom sessions, but much of the material was online, replacing what normally might have been classroom sessions

The course was primarily online – I rarely needed to come to campus

Question 3
Please estimate the number of study sessions during which you reviewed a recorded class lecture for this course.
Response Choices
  Never
  1-5 times
  6-10 times
  11-20 times
  More than 20 times

Question 4
Please rate the impact of distant learning (as opposed to in class) on your studying in this course.
Response Choices
  It made study much less effective than my normal study habits
  It had no impact on my normal study habits
  It made study much more effective than my normal study habits

Question 5
How often did you use the publisher's website for study materials for the course?
Response Choices
  Never
  1-5 times
  6-10 times
  11-20 times
  More than 20 times

Question 6
If you were part of the experiment with the Remote Proctor Camera, how would you rate this experience?
Response Choices
  Did not participate
  Found it to be a distraction while taking the exam
  Did not impact on my taking the exam

Question 7
Do you have any comments concerning the Remote Proctor Camera?

Question 8
Overall, what was the impact of distant learning (as opposed to in class) on your use of time in this course?
Response Choices
  Took more time than I would normally spend
  Took me the same amount of time
  Saved me some time
  Saved me significant time

Question 9
Would you want to take distant learning courses in the future?
Response Choices
  True
  False

Question 10
Overall, what was the impact of distant learning on your learning in this course?
Response Choices

A distraction to my learning
Did not contribute to my learning
Contributed somewhat to my learning
A significant contribution to my learning
A very substantial contribution to my learning

Question 11
Do you have any additional comments concerning your experience with the distant learning course?