A Non-Proprietary Self-Proctoring Protocol for Online Asynchronous Classes

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Research has been mixed over how effective online proctoring tools are in preventing academic misconduct, but research such as (Dendir & Maxwell, 2020) (Hylton, Levy, & Dringus, 2015) (Daffin, Jr. & Jones, 2018) (Alessio, Malay, Maurer, Bailer, & Rubin, 2017) (Akaaboune, Blix, Carrington, & Henderson, 2022) (Helaine & Maurer, 2018) (Wellman & Marcinkiewicz, 2004) have found support for online proctoring. This article provides a new method for proctoring online assessments as well a case study to compare the effectiveness of the online proctoring protocol against traditional face-to-face proctoring.

Protocol Requirements

Hardware

Students will need a computer with either a built-in or external webcam.

Software

Software that records both the student via webcam and the computer screen on which the assessment is taking place is required. Some universities will have screen recording software such as Kaltura, Zoom, or Screencastify available to students at no additional cost (though the cost of licensing such software being incorporated into tuition or other fees is still a cost to students). Professors that wish to forgo proprietary software entirely could use an open-source program such as OBS Studio.

Hosting Platform

A learning management system (LMS) such as Blackboard or Canvas can be used to host the videos, but other video hosting options could also be employed including video hosting website that allows for unlisted videos (i.e. YouTube) or a file sharing platform (i.e. Google Drive).

The Protocol

First, students will open their screen recording software and select that both the computer screen and the webcam be captured in the recording. Once the video recording begins the student will proceed to complete their online assessment as usual. Once the assessment is completed, they will stop the video recording. The video recording will then be uploaded to the LMS, other hosting sites, or sent directly to the instructor. Submissions of video recordings should have the same due date as the assessment itself or with a small margin to allow for the fact that it can take several minutes for large video files to upload.

Once the videos have been uploaded to the hosting site the instructor may use a variety of screening methods. Watching the entire videos can become extremely time intensive but may be warranted if the instructor believes that there is a high probability of academic dishonesty. To improve time efficiency a series of spot checks can be conducted, advancing each recording to a few random points in time to ensure that the correct student is still seated at the computer and that no unauthorized resources have been brought up on the computer screen. Should the instructor find evidence of academic misconduct in the video recording they may then proceed with the academic misconduct policy as stated in their syllabus.

Case Study

Data Collection

This protocol was used in multiple sections of an online, asynchronous, a freshman level math course at a two-year institution in the mid-western United States over a period of several semesters. As a control a face-to-face version of the same class was also offered at the same

institution. Both classes also used the same textbooks, instructor, grading scale, and assignments. The quizzes and exams were administered through the LMS for both the face-to-face classes and the online classes. The main difference being in the face-to-face class proctoring was done by an instructor walking around the classroom observing students while in the asynchronous class the protocol described in this article was used.

It is impossible to know the number instances of academic dishonesty that were not caught by either proctoring method so instead evidence of academic dishonesty will be looked at in terms of performance differences on assessments. Both groups of students received the same study materials, lectures, and assessments. If the classes without a live proctor significantly outperformed the classes with a live proctor this could be evidence of academic dishonesty. The data collected from both sets of classes were final letter grades. The final letter grades for the course were chosen as this is the measure of practical significance. Other undergraduate universities, graduate programs, scholarships, employers, etc. will only know if the student received a C+ or an A- so this is the level the analysis uses to attempt to detect academic dishonesty. A total of 96 students were in the face-to-face group and 89 students were in the asynchronous group. The grading scale at the collection site used a 4.0 scale as shown in table 1.

Table 1

The grading scale at the collection site

Letter Grade	GPA	Letter Grade	GPA
A	4.0000	C	2.0000
A-	3.6667	C-	1.6667
B+	3.3333	D+	1.3333
B	3.0000	D	1.0000
B-	2.6667	D-	0.6667
C+	2.3333	F	0.0000

Data Analysis

Equivalence testing was used to compare the students that were proctored face-to-face versus the students that used the online proctoring protocol described in this article. When performing an equivalence test a differential value is needed. This value is selected by the analyst

to represent how much a difference in means would be acceptable in the given experiment to still have the two data sets treated as equivalent. In this experiment letter grades are 0.3333 apart from each other, this value was rounded down to 0.3 to represent "less than a letter grade" difference and used as the differential. The face-to-face student group data is represented by the variable "face" and the online asynchronous student group data is presented by the variable "online".

H_0: face – online < -0.3 or face – online > 0.3

H_A: -0.3 ≤ face – online ≤ 0.3

Figure 1 shows the results of the statistical analysis performed at a 95% confidence level.

Figure 1

Equivalence Testing Results

Sample Statistics

Sample	*n*	*Minimum*	*Maximum*	*Mean*	*Std. deviation*
face	96	0.0	4.0	3.07639	0.959384
online	89	0.0	4.0	3.1236	0.913397

Equivalence Analysis
Null hypothesis: Not equivalent (two-sided)
Lower equivalence differential: -0.3
Upper equivalence differential: 0.3

Comparison	*Difference*	*Stnd. error*	*Lower 95% CL*	*Upper 95% CL*
face v online	-0.047206	0.137959	-0.275284	0.180872

Comparison	*Lower t-value*	*Upper t-value*	*Lower P-value*	*Upper P-value*
face v online	1.83238	-2.51673	0.0343	0.0064

Comparison	*Maximum P-value*	*Conclusion (alpha=5%)*
face v online	0.0343	Equivalence has been demonstrated.

As both the lower and the upper p-values are below 0.05 these two samples can be viewed as equivalent within the defined equivalence differential. This result provides evidence that the online group did not have an advantage over the face-to-face students when taking exams and quizzes.

Conclusion

The proctoring protocol described in this article relieves students of the burden of having to pay proctoring fees associated with some proprietary online proctoring systems and offers the instructor a chance to verify who is doing the work on assessments and what resources are being used. Since the protocol does require several steps for students it is recommended during the first week of class to have the students follow the protocol on a low stakes practice quiz, answering questions about the syllabus or pre-requisite knowledge for the class. This will allow the instructor to view videos and inform students about any corrections that need to be made to their implementation of the proctoring protocol before it is used on a more substantially weighted assessment.

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