

On-line Exams: Strategies to Detect Cheating and Minimize Its Impact

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ABSTRACT

Utilizing online exams offers a number of potential benefits. However, cheating remains a major concern. This paper is a case study that describes the researchers' attempts to document and prevent cheating on their online exams. They offer details of their efforts to reduce both the likelihood and impact of cheating on-line. Suggestions are offered that are designed to provide guidance for others wishing to pursue online exams in their classes.

Over the past several years, a number of academics have espoused the value of using on-line exams in classes as opposed to the face-to-face paper exams that are traditionally given in the college classroom. Most often, on-line exams are used in conjunction with a distance-learning course where all the course material is administered on-line. Theoretically, however, many of the benefits associated with using on-line exams in a distance-learning course should also be present if on-line exams are used in a more traditional course.

The authors of this paper used on-line exams in just that fashion. Although we teach separate sections of a course that meets face-to-face twice a week, we decided to explore the possibility of administering exams to our students on-line. The potential benefits of doing this are many and include increasing grading accuracy, cutting down on grading time, and providing students with immediate feedback.

Perhaps even more importantly, on-line exams can free up time in class to pursue other learning activities. In most classes, the time available always seems to run out sooner than the amount of important material that needs to be covered. If exams are taken out of the classroom and administered over the internet, then many instructors would find three or more additional class sessions in which they could cover additional material. Or, they may wish to cover the same amount of material, but cover it in greater depth. As this paper will document, we found all of these benefits and more when administering our exams on-line.

While we were very pleased with our initial experience, a nagging question persisted. Namely, we were concerned that students may have been cheating on the exams, and that the cheating may have been widespread. As such, we took a number of steps to try to detect any cheating on the on-line exams. In addition, we took a number of steps to try to minimize the impact of whatever cheating did occur that did not get detected.

In the sections that follow, we will first describe our course and learning environment in detail. Additionally, we will seek to document many of the ways that students could potentially cheat on on-line exams. Furthermore, we will outline the specific steps we took to detect it and minimize its impact. To conclude, we will share some of our positive experiences with on-line testing in general, and will outline additional steps we plan to take in the future to improve their effectiveness in the classroom.

STUDY DETAILS

As previously noted, we teach multiple sections of a single course that meets face-to-face two times per week. The course is called Organizational Behavior and is required for all undergraduate students in the School of Business. The only prerequisite for the course is that the students have at least Junior standing.

We work for a regional campus of Indiana University. We are strictly a commuter campus. Overall, there are approximately 6400 students in the university. Class size for the Organizational Behavior course averages 35 students.

Demographically, we have a mixture of both traditional and non-traditional students. The average age of the students is 24.7 years. The average number of completed credit hours was 73. There were slightly more females in the class than males (52%), and since this is a commuter campus, no one lived on site. The average length of time spent commuting to and from class was 17.6 minutes. Within this environment, we decided to see if we could effectively use on-line exams in a traditional class. However, we first needed to be reasonably sure we could minimize the impact of cheating.

POTENTIAL FORMS OF CHEATING ON ON-LINE EXAMS

Before describing the various means of cheating on the exam, it is important for us to discuss our testing protocol so that it is clear what students are and are not allowed to do. At the beginning of every exam, we include a paragraph that reads in part, “This is not an open book or open notes exam. This exam is to be taken during the allotted time period without the aid of books, notes, or other students. You have approximately 45 seconds per question to complete this exam. This exam must be taken on-line from start to finish. Do not download it to take it or distribute it to anyone. The statistics feature of Oncourse will monitor and report how you take this exam.”

We also verbally announce this statement in class prior to each exam and answer any questions students might have with regard to what is and is not allowed on the exam. As such, we have identified the following potential ways to cheat on our on-line exams:

- Having someone other than the student take the exam
- Exceeding the posted time limit
- Collaborating with others during the exam
- Downloading or distributing the exam to others
- Using material that is not allowed (textbook or class notes)

Identifying the possible means of compromising the integrity of the exam was an important first step, but it was only a first step. After devising this list, we then set out to try to detect whether or not cheating occurred.

IDENTIFYING CHEATING ON OUR EXAMS

The first step we took to try to identify cheating was to limit access to our exam only to students who were currently enrolled in our course. We did this by requiring a unique user ID and password before the student could even access the exam. By doing this, we were able to tell when someone using an ID other than those of our students tried to access the exam, and we prevented them from doing so.

While it is possible that a student might give their ID information to another student, we felt this was similar to many other face-to-face exam settings where no identification whatsoever is required. While some schools do require photo IDs, those can also be shared or even forged. So, while not foolproof, our method does provide some protection against unauthorized access.

With regard to exceeding the posted time limit, our testing software tracked this for us as the following screenshot documents.

Spring 2005 SE BUS Z441 21145 WAGE AND SALARY ADMINISTR... [oncourse.iu.edu](#)
 help | profile | exit

Welcome Syllabus Schedule Class In Touch Tools

General Settings

10254 - Exam 1, Z302, Spring 2005

Author: tkeefe
Section: 2005-2-SE-BUS-Z441-21145
Title: Exam 1, Z302, Spring 2005
Attempts (0 = unlimited)
 1 tries per user
Time Limit (0 = no time limit)
 60 mins.

Auto-Submit When Time Limit Expires
 Scramble Test Questions
 Allow Other Authors to Copy Questions

OK CANCEL

[Main Menu](#) | [Test Menu](#) | [Settings Menu](#)

After the given time limit (in this case sixty minutes) had expired, the program would automatically submit the exam whether or not the student had actually finished. We should note that students are able to delay the automatic submission if they go offline during the exam. The countdown clock does not advance if the students do this, but the software does log the time the exam was started and the time it was submitted. So, the instructors can see who had the exam open longer than allowed.

89.3%	67 / 75 pts
90.7%	68 / 75 pts
96.0%	72 / 75 pts
52.0%	39 / 75 pts
82.7%	62 / 75 pts
72.0%	54 / 75 pts
45.3%	34 / 75 pts
88.0%	66 / 75 pts
84.0%	63 / 75 pts
58.7%	44 / 75 pts

When this occurs, students are notified that their exam score is invalid and they then are required to take a make-up exam. Since it is possible that students may get knocked offline inadvertently during the exam, we also post this statement on the exam, “If you have any technical problems taking this exam, immediately notify the instructor by e-mail or phone (812 941 #####).” This way, the student can notify us that they were not cheating. Their exam score may still be invalidated, however, depending on how far over the time limit they went.

Inappropriate collaboration is another aspect of cheating that we have some means to detect. While we cannot physically observe cheating, we can track who is taking the exam at what time, and we can compare how closely their answers match. To begin, we log the time each exam is taken and we log the IP address that is used by the student.

it Grades Summary Report

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Grade	Raw	Time	Returned	IP
89.3%	67 / 75 pts	0 hr 39 min	2/15/2005 4:37:50 PM	12.220.226.16
90.7%	68 / 75 pts	0 hr 33 min	2/15/2005 12:24:07 PM	12.202.120.176
96.0%	72 / 75 pts	0 hr 43 min	2/15/2005 10:14:08 PM	12.220.71.227
52.0%	39 / 75 pts	0 hr 29 min	2/15/2005 9:47:53 PM	209.214.168.14
82.7%	62 / 75 pts	1 hr 1 min	2/14/2005 7:50:03 PM	149.160.22.111

In cases where the times are similar or identical and the IP addresses are also similar, we investigate further by copying the exam report into a spreadsheet. The test results are sorted by IP address and time returned.

Name	Grade	Raw	Time	Returned	IP
Black	93.3%	70 / 75 pts	0 hr 37 min	3/13/2005 12:29:26 PM	12.202.120.176
Hock	40.0%	30 / 75 pts	0 hr 23 min	3/15/2005 6:18:22 PM	12.202.185.185
Carri	89.3%	67 / 75 pts	1 hr 0 min	3/15/2005 10:10:15 PM	12.202.28.201
Seay	77.3%	58 / 75 pts	1 hr 0 min	3/13/2005 11:19:46 AM	12.203.198.82
Talans	72.0%	54 / 75 pts	0 hr 48 min	3/11/2005 12:31:52 PM	12.210.128.82
Smith	98.7%	74 / 75 pts	0 hr 56 min	3/14/2005 7:37:06 PM	12.220.129.104
Willa	94.7%	71 / 75 pts	0 hr 14 min	3/13/2005 6:05:34 PM	12.220.167.4
Barab	93.3%	70 / 75 pts	0 hr 58 min	3/11/2005 4:14:10 PM	12.220.226.16
Brang	89.3%	67 / 75 pts	0 hr 40 min	3/15/2005 10:22:37 PM	12.220.71.227
Trub	73.3%	55 / 75 pts	1 hr 0 min	3/15/2005 8:28:43 AM	12.74.63.107
Mor	70.7%	53 / 75 pts	0 hr 38 min	3/15/2005 12:43:59 PM	134.68.220.102
Hoon	76.0%	57 / 75 pts	1 hr 0 min	3/15/2005 10:50:35 PM	134.68.220.139

If exam results look suspicious, IP addresses can be traced. Sometimes they represent campus addresses that can be traced to specific machines. Since many students take their on-line exams while on campus, this is not problematic in itself. On the other hand, it is possible that students are working together on the exam, so we check to see how physically close the machines are to each other. In cases where the machines are located in close proximity, we pursue the potential cheating further.

Other times, the IP addresses can be traced to a specific company or even residence. In these cases, innocent explanations are less likely, so we pursue these further as well.

The next step we take is to analyze how closely the student's answers match each other. Here, we look for an overall match of at least 75%. For incorrect answers, we look for a match of at least 50%. When we find this to be the case, we go to the next step. This involves calling the students in question into our office for a face-to-face meeting where we ask for an explanation.

If the students have a reasonable explanation, we do not pursue further action; primarily because we have no physical evidence of cheating. What we often find, though, is that students on their own volunteer that they indeed were collaborating with a classmate. In cases such as this, we tell them that they will each receive grades of zero for the exam. Word of this spreads quickly to other students, and this serves as a deterrent against future cheating by others.

Taken together, we have several tools at our disposal that help us identify cheating on our exams. That said, this admittedly does not detect all forms of cheating and does not guarantee that cheating does not occur. Accordingly, we have designed our class in such a way that if a student does indeed cheat, the impact on his/her final grade will be minimized.

STEPS TO MINIMIZE THE IMPACT OF CHEATING

Some of the ways we minimize the impact of cheating rely on the same tools we use to detect it as outlined in the previous section. For instance, timing the exam helps lessen the opportunity that students have to utilize inappropriate material. If our exams had no time limit, the temptation to avoid studying and rely instead on looking up answers during the exam would be greater. By providing only forty-five seconds per question, we limit the students' ability to engage in this.

We also tend to ask lengthy, application-based questions. These questions take more time to process and are more difficult to look up in the textbook because the answers require a synthesis of information as opposed to a simple recitation of a fact. While we could take this one step further and require essay questions, we have not pursued that yet, but may do so in the future.

Timing the tests also makes it more difficult for students to collaborate during the exam. We add a further level of difficulty to any attempt at collaboration by scrambling the order of the test questions on each exam. This prevents students from simply asking each other the answer to question six, for example, because the question order will be different on each exam.

In a similar vein, we also take steps to minimize the likelihood that someone other than the student is taking the exam. One of the primary ways we do this is to have multiple assignments due during the course of the semester. In a typical semester, each student will need to submit over twenty separate assignments on-line. Although it may be relatively easy for them to get help on one of them or even a few of them, it will be considerably tougher and / or more costly to find someone willing to complete every on-line activity for them.

Yet another way we minimize the impact of collaboration is to require a cumulative, face-to-face final exam at the end of the semester. This exam is weighted more heavily than the other exams and has a pronounced impact on the students' final grades. If they have not been keeping up with the material throughout the semester (i.e., they have had someone else doing their work), they are very likely to fail the final exam. If they fail the final, it carries enough points that they are unlikely to get an A or a B in the course regardless of how well they did on any other assignment.

All told, these steps help us minimize the impact that cheating has in our classroom. While we certainly have not eradicated its occurrence, we suggest that totally eliminating it is not likely on any exam, face-to-face or on-line. Instead, these steps have allowed us to lessen the likelihood of cheating and also lessen the temptation for cheating to the students. This has allowed us to realize many benefits in the classroom that we would not have had if we had given our exams in the traditional manner.

OVERALL ASSESSMENT OF ON-LINE EXAMS

Overall, we are quite pleased with the impact that using on-line exams has had in our classes. By using this method, we have freed up three entire class periods worth of time. We have used this time to have class discussions that were more in-depth and focused than time normally allowed. We have also been able to add more group activities and experiences that require students to take some of the theoretical concepts we discuss in class and apply them to their personal lives.

Student satisfaction with this approach has been high. Not only do the students enjoy the flexibility of taking the exams at a time that is convenient for them, they also report learning more in the classroom. Because we are able to use experiential exercises in class that we did not have time to use before, they also report greater satisfaction with the material. It is more meaningful to them because they have internalized more of it.

This would be more difficult to accomplish if we were not able to free up class time by using on-line exams. On-line exams would not be possible if we did not have cheating under control. By taking the steps we have to detect cheating and minimize its impact, we have been able to take class exams offline and have had a more rewarding classroom experience for our students. We are very encouraged by the initial results.

FUTURE STEPS

While this study does help provide some insight as to how to detect cheating and minimize its impact, the work in this area is just beginning. As more and more academics decide to explore the possibility of using this form of testing, additional steps need to be taken to ensure that cheating is minimized. As such, it is important that further research be devoted to this crucial topic.

One area ripe for further exploration is to undertake additional steps to enhance the testing protocol that is used. As an example, some schools have reported success in having students formally sign honor codes before taking exams. It may be beneficial to see what impact this might have in an online testing environment.

Another potentially promising area that we plan to explore is to look at whether or not student personality characteristics might influence their propensity to cheat. We are currently collecting data on such variables as student self-efficacy and self-esteem to see whether or not there might be a significant relationship between them and subsequent cheating on exams.

To conclude, we encourage other instructors to engage in this field of research. The benefits of using online exams are numerous, but until teachers and administrators can be reasonably assured that cheating is not rampant, they will not be fully utilized in the classroom and many of these benefits will go unrealized. By continuing to explore the topic of cheating on online exams, the problem can be further minimized and the general classroom experience can be enhanced.