REDUCING AND DETECTING ON-LINE EXAM CHEATING: BUILDING A BETTER MOUSETRAP.   PROTOCOLS FOR CANVAS AND OTHER LEARNING MANAGEMENT SYSTEMS

Elizabeth Stanny, School of Business and Economics, 1801 East Cotati Avenue, Rohnert Park, CA 94928, 707-664-4287, stanny@sonoma.edu
John C. Urbanski, School of Business and Economics, 1801 East Cotati Avenue, Rohnert Park, CA 94928, 707-664-2707, urbanskj@sonoma.edu

ABSTRACT

The authors provide protocols to reduce item harvesting and item pre-knowledge [7] in order to protect the integrity of online multiple choice examinations for use in future administrations of an exam. The study also adapts methods used in Golden and Kohlbeck [4] to help the instructor determine if cheating is occurring with online exams, and provides instructions for use with the Canvas and other online learning platforms. After administration of a multiple choice exam to 85 undergraduate business students in a management class that one author teaches each semester, statistical analysis demonstrated that widespread cheating did not occur.

Keywords: academic dishonesty, cheating, online exams, Canvas, learning management systems

Anecdotal evidence in the popular press illustrates that academic dishonesty, specifically cheating on exams, remains a rampant problem in higher education [5] and is increasing as a result of the wholesale move to on-line education necessitated by the 2019 coronavirus pandemic [1] [2] [9] [10].

Support for online cheating has also turned into a multi-billion dollar for-profit industry [3]. Numerous contract cheating web sites are available, offering resources to assist students with engaging in various forms of academic dishonesty. A quick Google search lists a multitude of online vendors that provide services to help students cheat on exams as well as engaging in other academic dishonesty [6].

The current study is specifically targeted at the reduction of cheating that occurs with multiple choice exams as a result of what is termed item harvesting, where students make an effort to collect exam questions and answers beforehand, as well as item pre-knowledge, when students obtain exam information such as test banks from internet and other sources [7], the latter issue one addressed by Golden and Kohlbeck [4].

Golden and Kohlbeck note practices which combine to erode exam integrity such as instructors' reliance on published question sets and test banks; citing several sources [11] [8], which illustrate the ease with which students can access and purchase these materials online. Golden and Kohlbeck also discuss laxity with exam materials on the part of instructors which serve to promote item harvesting and item pre-knowledge.

One of the current authors became concerned about exam integrity several years ago. Students would frequently be absent from class, some missing approximately 50% of scheduled lectures, yet be among the top performers on examinations. During a module addressing ethical behavior, the author discussed cheating, stating not only was academic dishonesty morally wrong, but also that an increase in exam

averages due to dishonesty reduced the value of any curve which might be applied to every student's exam. A student quickly enlightened the author, stating that "Greek" organizations on campus had developed test banks containing copies of exams, with answers, from most of the institution's instructors, a practice which seems to be wide spread across many institutions of higher education [5]. Exams with correct answers would be given to members of the organization, or would be sold to non-members. Now enlightened, the authors then developed exam administration and review protocols to prevent item harvesting and item pre-knowledge from occurring in an attempt to reduce exam dishonesty. The protocols used by the current authors to counteract these practices are found in Appendix One.

To determine if the protocols were effective measures against dishonesty, the authors manipulated administration of an exam in a manner similar to that used by Golden and Kohlbeck [4]. Golden and Kohlbeck, however, attempted to determine if during the exam, via the web, students were accessing standard test banks paired with the course text, rather than the use of item gathering and item pre-knowledge the current study is attempting to eliminate.

Procedures

For the initial iteration of the planned exam manipulations, students in three organizational behavior classes taught by one of the co-authors were administered their first regular semester examination. Per the institution's IRB, all students in the three classes were given the option to participate in the study, however, students were not informed of the true nature of the study, instead, they were told the authors wished to enhance the operation of Canvas as Sonoma State University's online learning platform. This deception was approved by the institution's IRB. Those who elected to participate were also asked to complete a brief demographic questionnaire. Eighty-five students participated. All students majored in some aspect of business administration. Ages ranged from 20 to 47 years of age, however, 86% of participants were 20 to 23 years of age. Thirty-nine students identified as female, 46 participants identified as male. Thirty-six participants were juniors and 49 were seniors.

The exam consisted of 40 conceptual multiple-choice questions developed by the instructor. Approximately two-thirds of the questions were derived from lecture material and the remaining one-third from text material, however, the instructor personally wrote these questions using materials from the text rather than depending on standard test bank questions. As with the Golden and Kohlbeck study, the exam used two sets of questions; the first set comprised of questions the instructor had been using for several semesters, the other comprised of paraphrased questions from the first set (see Appendix 2 for sample questions).

The exam was administered remotely using the Canvas learning platform. Students were given one hour and fifty minutes to complete the exam. The test taker was able to view only one question at a time. Questions as well as answers were not shuffled. Students were required to be monitored in a Zoom conference to ensure the actual student and not a replacement was taking the exam, and to reduce the possibility that students had materials available that would constitute cheating; however, observation of the students' entire test-taking environment was not possible.

As with Golden and Kohlbeck the first iteration used a within-subjects design. The Canvas platform was coded so that each student received a random but approximately equal mix of questions from the first and second set of questions (coding instructions for using the Golden and Kohlbeck method with the Canvas online learning platform are available from the authors).

Analysis

The authors had planned on testing exam integrity with all versions of the exam administration formats used in the Golden and Kohlbeck study. Statistical analysis of the first iteration of the exam, however, unlike the original study, failed to demonstrate any significant differences (p-value= 0.6) between scores on items from the original set of questions and items from the paraphrased set of questions, providing strong support to the idea that the set of integrity protocols developed by the authors of the current study was a significant bulwark against the possibility of cheating occurring during exams of this type. At this point, the authors felt there would be no need to conduct further iterations of the exam administrations used by Golden and Kohlbeck, and ended the study.

APPENDIX ONE
PROTOCOLS FOR IN-PERSON, CANVAS AND OTHER
ONLINE-ADMINISTERED EXAMINATIONS

The following are the protocols used by the authors to promote integrity of their examinations. All are remedies which come from experiences the authors have had with students found cheating on examinations. Some instructors may believe these to be somewhat onerous, but as noted in the study, they have served to significantly reduce or eliminate cheating.

Note: Most on-line learning platforms share similar features with Canvas, and the suggestions found here can most likely be used with other platforms

1. Write original questions from lecture material. The material included in your lecture is obviously the most important. Using questions formed from lecture encourages the students to focus on that material.

2. Avoid use of the textbook's test bank if at all possible. Many test bank questions may not be well-written. Write your own questions from the text. Focus on concepts you believe to be key subject matter. This will attenuate students finding and using examination material from online sources.

3. Never return a copy of an exam to any student. If you do, copies will soon be spread across campus like wildfire. This is how campus test banks are formed.

4. Be willing to allow the students to review their exams, but only under your supervision or that of an assistant.

5. Do not leave students unattended with an examination unless you are sure they are phone-free. In the age of camera phones, it only requires moments for a picture of exam material to be taken.

6. As with 5, should you have an in-class review, ensure that all phones are put away. Students have been observed using phones to photograph exam materials projected on large video screens.

7. For multiple choice exams, never provide less than five possible answers for each question. The greater the number of choices, the more difficult it becomes to memorize answers.

8. Write conceptual-type multiple choice questions (see Appendix Two for an example). They are much more difficult to memorize than definitional-style questions, and they enhance student learning.

9. When using Canvas, or a learning platform with similar features, set the exam to show the student only one question at a time. This reduces the possibility of exams being copied with screen shots while the student is taking the exam.

10. With Canvas, do not allow students to see their quiz responses, and limit access to the exam to only the period in which the exam is being administered. Again, this prevents screen shots being used to copy exams.

11. Be willing to review Canvas exams with students on-line in a Zoom meeting. The student's exam should be available only to the instructor, and screen-shared with the student rather than providing the student direct access to the exam.

<center>**APPENDIX TWO**
A SAMPLE EXAM QUESTION</center>

Original Question

Dr. Jendrzewski has won the Powerball! $156 Million! His poor management students see this as their big break: there would have to be a new professor taking over class, wouldn't there? (Things can only get better, how much worse could it get?). After collecting his lump sum payment of $68 million, however, there he is next class, happily lecturing away about motivation. The horror! They re-read his syllabus: he states he plans on working until at least his 100th birthday. Dr. Jendrzewski's decision to keep working can best be attributed to:

a. low self-esteem
b. high Machiavellianism
c. high work ethic
d. high extrinsic motivation
e. low collective orientation

Paraphrased Question

Sonia Schmidt has just inherited $250 million. All the local teens in the neighborhood see this as their chance to earn money doing odd jobs for her. Surely with all this money she would want to spend most of her time relaxing. The next morning, the teens are horrified to see her fire up the lawnmower immediately after coming back from walking her dog to the paint store where she purchased all the equipment she will use to paint her house. Sonia's desire to continue working can best be attributed to:

a. low self-esteem
b. high Machiavellianism
c. high work ethic
d. high extrinsic motivation
e. low collective orientation

REFERENCES

[1] Associated Press (2021, August 20). Naval Academy expels 18 after online exam cheating probe. *ABC News*. Retrieved from https://abcnews.go.com/US/wireStory/naval-acdemy-expels18-online-exam-cheating-probe-79562085

[2] Bilen, E. & Matros, A. (2021). Online cheating amid Covid-19. *Journal of Economic Behavior and Organization*, 182, 196-211.

[3] Braithwaite, T. (2021, September 24). Student cheating is now a multibillion dollar business. *Financial Times*. Retrieved from https://www.ft.com/content/3fcfcf72-4838-49e5-b9ce-a360b5b5ab6b

[4] Golden, J. & Kohlbeck, M. (2020). Addressing cheating when using test bank questions in online classes. *Journal of Accounting Education*, 52, 100671.

[5] Jouvenal, J. & Anderson, N. (2018, April 24). Student's death leads to investigation of possible cheating at George Mason. *The Washington Post*. Retrieved from https://www.washingtonpost.com/local/public-safety/students-suicide-leads-to-investigation-of-possible-cheating-at-george-mason/2018/04/24/beed4e7e-47c8-11e8-827e-190efaf1f1ee_story.html

[6] Kasen, J. (2021, August 2). *How to cheat in online exams: Proctored exam, tests or quiz.* Gradebees. https://gradebees.com/cheat-online-tests/

[7] Le, V., Tran, T.N.T, Felfernig, A, Atas, M., Weissl, L., Popescu, A., Stettinger, M. & Polat-Erdeniz, S. (2021). Counteracting exam cheating by leveraging configuration and recommendation techniques. *Proceedings of the CEUR Workshop,* Austria, 2954, 73-80.

[8] Madara, B., Resha, C., Krol, M., Lacey, K., Martin, E., O'Sullivan, C., & Smith, J. (2017). Nursing students access to test banks: Are your tests secure? *Journal of Nursing Education*, 56, 292-294.

[9] Meyer, C. (2020, September 8). Prevent cheating while teaching remotely. *AICPA Newsletter*. Retrieved from *https://www.journalofaccountancy.com/newsletters/extra-credit/how-to-prevent-cheating-while-teaching-remotely.html*

[10] Newton, D. (2020, September 7). Another problem with shifting education online: A rise in cheating. *The Washington Post*. Retrieved from https://www.washingtonpost.com/local/education/another-problem-with-shifting-education-online-a-rise-in-cheating/2020/08/07/1284c9f6-d762-11ea-aff6-220dd3a14741_story.html

[11] Savage, A., & Simkin, M.G. (2010). Ethical concerns about the online sale of instructor-only textbook resources. *Research of Professional Responsibility and Ethics in Accounting*, 14, 213-231.

[12] Watson, G.& Sottile, J. (2010). Cheating in the digital age: Do students cheat more in online courses? *Online Journal of Distance Learning Administration*, 13(1) n. Retrieved from https://www.westga.edu/~distance/ojdla/spring131/watson131.html