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TEACHING ASTRONOMY - USING HYBRID TEXTBOOKS TO COMBAT ACADEMIC E-CHEATING

M. M. Montgomery
University of Central Florida, Physics Department, 4000 Central Florida Boulevard, Orlando, FL 32816, USA
E-mail: Michele.M.Montgomery@ucf.edu
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ABSTRACT

To accommodate today's higher education student, fewer textbooks are printed and more are becoming digital. Keeping with the modern era, hybrid versions of textbooks have all end-of-chapter assessment content moved to digital learning systems such as MindTap^{TM} by Cengage Learning®. In this work, we introduce new pedagogical strategies to combat academic e-cheating, specifically cheating on assessments given in online astronomy courses. The strategies we present in this work are employed in *Horizons: Exploring the Universe, Hybrid*, 13th Edition, and *Universe, Hybrid*, 8th Edition, by Seeds, Backman, and Montgomery.

Key words: history and philosophy of astronomy

1. INTRODUCTION

As noted in Radmofsky & Bobrowsky (2004), distance learning has caused a paradigm shift [Kuhn (1962)] in education. Strategies (e.g, asking questions to students to assess on-the-spot student learning) and philosophies (e.g., lecturing) that work in face-to-face classroom environments do not necessarily work in virtual classroom environments. The learning environment has to be re-engineered to the needs of the student learning online [Abdelraheem (2003) and Dabbagh et al. (1999)]. To this we add that the methods of assessment have to also be re-engineered for the online environment, especially to combat the academic dishonesty of e-cheating such as looking up answers to assessment questions while taking the assessment.

Students in online courses usually work independently, at their own pace, and unproctored. As such, these students are more tempted to e-cheat, whether alone or in collaboration, through the use of the Internet [Scott (2001)] and technology [Boehm et al. (2009)]. Exams and quizzes that test on knowledge, where the answers are very clear, are more likely to involve academic e-cheating as students are more tempted to research or look-up the answers.

Strategies to combat academic e-cheating on knowledge-based exams [see e.g., Rowe (2004), Krovitz (2007), Olt (2009)] include

- using proctored exams where the proctor is physically nearby the examinee;
- requiring students to login to a particular platform using a username and password and/or logging into the exam using another password;
- limiting exams to certain IP addresses;
- requiring the usage of cameras during the exams, which reduces the virtual distance between the webassessor, instructor, proxy, or e-proctor and the distance learner;
- limiting the amount of time available per question and for the entire exam;
- randomizing the questions;
- not using exams with existing online answer keys;
- not returning the correct answers until the exam has been completed by the deadline;
- using services such as TurnItIn;
- using platforms that record keystrokes, analyze word patterns, analyze keystrokes, etc. for the purposes of creating a document or e- fingerprint during the course for each student.

These strategies are meant to limit opportunities for e-cheating, catch and punish e-cheaters who violate policy, and encourage students to practice academic integrity and academic excellence.

Besides the usage of electronic cheating aids, textbooks, or other materials during quizzes and exams that test on knowledge, the submitting of material not generated by the student seems to be the other more common academic cheating method for online classes. In this work, we focus on the former: We introduce a new pedagogical strategy to combat academic e-cheating, specifically cheating on knowledge-based assessments given in online astronomy courses.

Question strategies introduced in this work are actively employed in the online teaching and learning resources to Seeds et al. (2015a) and Seeds et al. (2015b). These hybrid astronomy textbooks have been

re-engineered for the online astronomy environment to combat this type of e-cheating.

In §2, we discuss new pedagogy strategies. In §3, we conclude and discuss future work.

2. PEDAGOGICAL STRATEGIES TO COMBAT E-CHEATING

One strategy to combat e-cheating is to plan for this type of cheating to occur. For example, a plan could include listing policies and consequences of academic dishonesty on a syllabus. Students may have different views of what constitutes e-cheating and thus discussing whether textbooks, notes, etc. are allowed during e-assessments may help reduce e-cheating.

Another strategy to combat e-cheating, and one we focus on in this work, is the re-writing of assessment questions to incorporate the new question strategies we introduce in this work: In the hybrid astronomy textbooks Seeds et al. (2015a) and Seeds et al. (2015b), the multiple choice and true/false questions have been modified to make ease of look-up more difficult for the distance learning during an online assessment. For example, we employ the question strategy of *multi-matching*: A question might ask a student to find the correct match between a list in Column A and a list in Column B. Column A might list by letter and Column B might list by Roman numeral, and thus the matching choices only have letter and Roman numeral combinations.

Another question strategy we introduce in the Seeds et al. (2015a) and Seeds et al. (2015b) hybrid astronomy textbooks is *active testing*. Active testing requires the distance learner to perform a particular task before answering the question. Active testing is based on active learning. For example, a distance learner might be asked to measure the angular diameter of a particular object, after having practiced the technique prior to the exam by the methods discussed in the text.

A third question strategy we employ in the Seeds et al. (2015a) and Seeds et al. (2015b) hybrid astronomy textbooks is fill-in-the-blank. A sentence is given with several keywords missing and an alphabetized list of possible keywords is given. The multiple choice answers thus contain only letter choices.

A fourth question strategy we introduce in the Seeds et al. (2015a) and Seeds et al. (2015b) hybrid astronomy textbooks is *multi-tasking*. For example, two questions may be asked, with the first being a fill-in-the-blank type and the second being a yes/no type that depends upon the answer to the first.

A fifth question strategy we introduce in the Seeds et al. (2015a) and Seeds et al. (2015b) hybrid astronomy textbooks is *telescoping*. By asking a question that is very specific and/or unique, however the subject is common, the look-up answer is not likely to be the correct answer.

These are just some of the many question strategies that have been introduced in the Seeds et al. (2015a) and Seeds et al. (2015b) hybrid astronomy textbooks to combat e-cheating. These question strategies are more difficult or too time consuming to look up. For example, if a question has multiple blanks and multiple answer choices, the permutation of possible answer combinations is large and thus too time consuming to look up easily.

3. CONCLUSIONS AND FUTURE WORK

In this work, we introduce new methods to combat e-cheating on knowledge based exams in an effort to overcome student gaming of the online education system. Specifically we introduce new question strategies such as *multi-matching*, *active testing*, *multi-tasking*, and *telescoping*.

For future work, we expect to provide question analytics that show not only reduced ease of look-up but also significant improvement in testing of knowledge content. In addition, as we learn the latest forms of test fraud, we will continue to strive to improve our methods of assessment via the hybrid versions of Seeds et al. (2015a) and Seeds et al. (2015b) for the teaching of and learning of astronomy in distance education. This improvement includes smart-e-testing, where future questions asked are based upon the past answers given. Smart-e-testing e-tailors the examination to each distance learner, making easy look-up of answers more difficult for the distance learner. Smart-e-testing may be the next revolution in assessing distance learning.

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REFERENCES

Abdelraheem, A., 2003, Computerized Learning Environments: Problems, Design Challenges and Promises, Journal of Interactive Online Learning, 2(2). National Center for Online Learning Research. http://www.ncolr.org/jiol/archives/2003/fall/01/index.html

Boehm, P. J., Justice, M. & Weeks, S., 2009, Promoting Academic Integrity in Higher Education, The Community College Experience (spring) 45-61

Dabbagh, N., Bannan-Ritland, B., & Silc, K., 1999, Web-Based Course Authoring Tools: Pedagogical Implications, AACE proceedings of the World Conference on Educational Multimedia, Hypermedia & Telecommunications, EdMedia 1999, Seattle, Washington

Krovitz, G. E., 2007, Ways to Prevent Cheating on Online Exams, eNewsletter: Educator's Voice, 8, 6

Kuhn, T., 1962, The Structure of Scientific Revolutions, Chicago: University of Chicago

Olt, M. R., 2009, Seven Strategies for Plagiarism-Proffing Discussion Threads in Online Courses, Journal of Online Learning and Teaching, 5, 2, 222

Radnofsky, M. L. & Bobrowsky, M., 2004, Teaching Astronomy Online, AEDRv, 3, 148

Rowe, N. C., 2004, Cheating in Online Student Assessment: Beyond Plagiarism, Online Journal of Distance Learning Administration, 7, 2

Scott, K., 2001, Academic Dishonesty: The impact of Honor Codes of Cheating Perceived by Student Leaders in Selected Texas Universities. Dissertation Abstract International, 62, 9105, 1359A, UMI No. 3011796

Seeds, M. A., Backman, D., & Montgomery, M. M., 2015, Horizons: Exploring the Universe, Hybrid, Stamford, CT: Cengage Learning
Seeds, M. A., Backman, D., & Montgomery, M. M., 2015, Universe, Solar Systems, Stars, and Galaxies, Hybrid, Stamford, CT: Cengage Learning