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Dale Varble
Indiana State University, dale.varble@indstate.edu

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Dale L. Varble, Indiana State University
dale.varble@indstate.edu
Terre Haute, Indiana

Abstract - This paper focuses on reducing cheating opportunities of online test assessment. Increasing use of online test in all course presentation formats (online, blended/hybrid or facilitated) has elevated faculty concerns of cheating. Efforts by educators to reduce cheating have been ongoing and with some success but, as the results of a study reported here more is needed. Two sections of a course, one online and one onsite were offered the same semester, with the same instructor, syllabus, textbook and tests. The online students took all tests online. The onsite students took all exams online except the last two tests and final exam which were paper and pencil taken in the classroom. Online students scored higher than onsite students on all tests with one exception. The scores were significantly higher when the onsite students took the paper and pencil tests. Online testing introduces a new testing environment that requires more thought and care to reduce cheating and uphold academic integrity. Faculty using online testing must make decisions each semester on how best to achieve the benefits of online assessment while keeping cheating in check.

Keywords – Online testing, Cheating, Cheating reduction, Test integrity, Reducing need to cheat, Assessment testing, High and low stakes test

Relevance to Marketing Educators, Researchers and/or Practitioners – Testing continues to be a popular method of assessing the amount and type of learning that has occurred. The integrity of the test and the testing process is fundamental to the validity of the data resulting from tests. As the data collected from an online section and a face-to-face section of the same course in this research demonstrates. Marketing educators teaching online courses have a number of decisions to make that impact the integrity of the test results. The decisions involve three major conditions; the opportunity to cheat, the need and/or reward of cheating and the rationalization/attitude of the cheater.

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Introduction

Online test assessment usage has grown. At least one online course was taken by 6.7 million students in 2012, Allen and Seaman (2013). An online course as defined by Allen and Seaman has 80+% of the material delivered online. Instructors may also opt to use the online mode of test delivery in blended/hybrid and web facilitated courses. Online objective test delivery attractions include convenient and quick assembly of test (especially when a test bank is used,) not having to make paper copies, test scored automatically with feedback to student immediate, scores automatically recorded in the gradebook and test analysis available immediately, and in-class time not needed for testing. The attractions to students of online test include more latitude of where and when the test is taken.

On-the-other-hand faculty have concerns about the integrity of the online testing environment and maintaining the environment close to that of paper and pencil test with cell phones and other technological devices not permitted, given in a classroom and proctored by a human present in the room. Thus faculty each semester considers and makes many decisions on techniques to reduce cheating in online testing.

Literature Review

Cheating and fraud behaviors are related along three conditions that predicate the behavior Becker et al. (2006); Ramos, M. (2003). The fraud triangle concept divides the conditions commonly found in fraud and cheating into three categories; opportunity, incentive/pressure also referred to as need, and rationalization/attitude. The fraud triangle concepts serves as a basis for a taxonomy of cheating prevention techniques with potential for reducing cheating in online tests is shown in figure 1.

In figure 1, all the methods of reducing cheating on a test have drawbacks or shortcomings some more significant than others. Shortcomings include increasing time, costs, and intrusion into the student's personal privacy, with cameras for example. Moving down the list in each category, especially in the opportunity reduction category, increases the investment of time for the instructor and for the student. Both time and dollar investment goes up for the student as the student typically pays when there are additional costs such as for cameras and human proctors. For both faculty and students moving down the category reduces the flexibility of online testing-the very aspect that makes it attractive to students and faculty alike and may at the same time increase the frustration by requiring more scheduling, more understanding of software and more setting up and using of hardware. Therefore how far down in the list of techniques to reduce cheating in each category do faculty need to move to reduce cheating on test to an acceptable level which is the level typically found in a human proctored paper and pencil assessments? The fraud triangle requires all three conditions of the fraud triangle be met for cheating on test given online to occur. If any of the three conditions are eliminated or reduced less cheating should occur. Faculty have some influence on all three conditions.

Figure 1. Methods with Potential to Reduce Online Cheating on Test.

Opportunity Reduction	***Need and/or Reward Reduction***	***Rationalization/attitude Reduction***
1. Select questions randomly from a questions bank for each student, 2. Reduce the average time to answer each question, 3. Allow only one attempt to take test, 4. Require completion of test once started, 5. Present one question at a time, 6. Randomize questions and answer choices for each student 7. Use lockdown browser, 8. In objective test use more multiple choice under-standing questions and fewer remember type questions. 9. Proctor exams with camera 10. Proctor exams with human proctor 11. Develop new questions each semester 12. *Use essay questions, Grijalva. (2006)*	1. Reduce value of each test Rudner (2010), Grijalva. (2006) 2. Allow multiple attempts 3. Have open-book exams 4. Allow students to use their class notes 5. Assist students with time management skills, 6. Repeatedly emphasize the true value of education; knowledge acquired. 7. Increase risk of being caught, 8. Increase significance of punishment 9. Use more formative assessment and less summative assessment.	1. Post and discuss integrity guide-lines, conduct codes, Gibbons, A. (2002) 2. Emphasize specific activities constituting cheating and associated punishments, Scanlon (2004) 3. Maintain vigilance and enforce punishments

Faculty attempt to reduce rationalization and change attitude by addressing the common rationalizations before cheating occurs. Common rationalization explanations for cheating on test include: I did not know that was cheating; It did not hurt anyone i.e. it is a victimless activity; I know someone else that does the same thing, in fact, everyone does it, it is no big deal; I worked hard in this class I deserve a good grade; I have a job, a family, and other responsibilities, I didn’t have the time to adequately prepare for this course, test.

A survey of online students by Jones, Blankenship and Hollier (2013) found that 58 percent of the students did not believe that using and open book during an exam was cheating nor was using personal or class notes. Faculty address the "did not know it was cheating" by including in the syllabus a class code of conduct, a university code of conduct and class discussions of what constitutes cheating. Other sources of influence exist, however, that may knowingly or unknowingly encourage rationalization; for example peers with peer pressure, faculty who have lenient eyes when observing cheating, parents who emphasis grades and having the degree, and friends who are cooperative. Need and reward reduction may also necessitate the faculty member to re-think the meaning of the educational/learning processes. For example, "If the student knows the material why should the test be open book? An open book test only means that the student knows how to lookup the answers in the book." Such an opinion however runs counter to many of the techniques to reduce cheating within the need and reward reduction category. Rovai (2000) discusses assessment in terms of relationships, construction of understanding through discussions, inquiry and collaborative work for example. Influencing need and reward are more direct for faculty than the influence for rationalization/attitude but influence on the opportunity condition is the most direct and immediate for faculty. In the "Opportunity Reduction" category, the primary focus of this study, the majority of faculty at colleges and universities use items 1, 2, 3, 4 and 5 in figure 1 according to Gao (2010).

Research Design

This study addresses reducing the opportunities to cheat in online test. Previous studies have addressed cheating of students taking test online by collecting data on students' perceptions of the amount and methods of cheating Harmon, Lambrinos & Buffolino, (2010); Conner, (2009); Watson & Sottile, (2009); King, Guyette, & Piotrowski, (2009); Black, Greaser & Dawson, (2008). Data of students' actual test scores are analyzed in this study. Two sections of a junior level undergraduate marketing course, one online and the other in the traditional classroom (onsite) were used to gather data. The sections were offered the same semester, with the same instructor, syllabus, textbook, schedule of assignments and tests. Tests counted for slightly over 60% in the calculation of the semester grade. The tests were 15 tests one each week and a comprehensive final test. To give the students time to acclimate to the course, testing procedure and the instructor the first two tests were not included in the analysis. Each test consisted of 20 multiple choice questions from a test bank provided by the book publisher. Questions were from the reading assignment for the week. The 13 tests included in the analysis and the final exams were online for the online course. For the onsite course tests, one through 11 were online and tests, 12, 13 and the final comprehensive test, were paper and pencil in the classroom and proctored by the instructor. The online tests were administered through Blackboard and Respondus Lockdown browser combined. The parameters for the quizzes permitted the student 25 minutes to complete the 20 multiple choice questions. With the requirement that the test be opened in a new window, one question shown at a time, only one attempt at the test allowed, forced completion of the 20 questions of the test once started and no backtracking to previously answered or skipped questions permitted. The questions were randomly selected from a large test bank and the order randomized for each student. Thus students would not have identical test questions and, if by chance they did have, the order of the questions would be different. Additionally Respondus' Lockdown browser was required to take the test. The browser locks the computer to any other applications/uses once the test is started.

Results

Data were gathered on 19 onsite and 28 online students. Thirteen sets of tests were analyzed. Each test was worth a maximum of 20 points.

Table 1: Descriptive Statistics of Individual Examinations

Exam	*n*	*Min*	*Max*	*Mean*	*Standard Deviation*
1	46	6	20	14.65	2.92
2	44	10	20	14.95	2.50
3	44	6	20	13.43	3.57
4	44	9	20	15.64	2.65
5	46	12	20	17.63	2.05
6	45	9	20	14.60	2.84
7	46	8	20	15.61	3.07
8	46	8	20	15.91	2.78
9	46	12	20	17.52	1.86
10	45	8	20	14.40	2.96
11	42	7	20	15.52	3.23
12	47	0	20	12.11	4.50
13	43	5	20	13.37	3.67
Final Exam	47	60	200	134.67	29.39

Note. $N = 47$.

Not every student completed every test. Descriptors are provided in Table 1, while correlations among the tests are provided in Table 2. A mean substitution of missing scores was conducted resulting in $N = 47$.

Table 2: Intercorrelations Among the Tests

Test	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***	***11***	***12***
1	--											
2	.30*	--										
3	.37**	.24	--									
4	.27	.06	.23	--								
5	.34*	.22	.41**	.40**	--							
6	.46***	.43**	.35*	.16	.27	--						
7	.37**	.23	.41**	.13	.23	.28	--					
8	.47***	.34*	.47***	.21	.54***	.40**	.36*	--				
9	.53***	.21	.29*	.18	.27	.37*	.35*	.27	--			
10	.40**	.36*	.49***	.18	.29*	.28	.27	.35*	.28	--		
11	.40**	.33*	.21	.11	.08	.37**	.30*	.24	.67***	.20	--	
12	.21	.51***	.32*	.12	.27	.29*	.28	.28	.40**	.39**	.34*	--
13	.42**	.45***	.54***	-.02	.29**	.28	.36*	.45***	.41**	.37**	.24	.56***

Note. *$p < .05$; **$p < .01$; $p < .00$, two-tailed.

Split-Plot Analysis of Variance

A 2 (type of delivery: onsite/online) X 13 (tests) split-plot ANOVA was conducted to determine if differences between the online and onsite students existed for each of the 13 tests. Descriptive information is broken down across the two groups in Table 3 and illustrated graphically in Figure 2.

Both Box's M (M = 146.45, p = .304) and Mauchley's W (W = .10, p = .096) were non-significant, indicating the assumptions of homogeneity of covariance matrices and sphericity had been met respectively. Additionally, all Levene's tests were non-significant at $\alpha = .01$, indicating homogeneity of variances for all of the individual tests.

Table 3: Means, Standard Deviations, and Simple Main Effects for Comparing Online and Onsite Delivery at Each Test

Test	*Onsite M(SD)*	*Online M(SD)*	*F(1, 45)*	*Cohen's d*+
1	14.32 (3.15)	14.88 (2.74)	.43	.19
2	13.99 (2.11)	15.61 (2.42)	5.54*	.70
3	12.23 (3.54)	14.25 (3.19)	4.17*	.61
4	16.00 (2.36)	15.39 (2.71)	.64	.24
5	17.24 (2.30)	17.89 (1.81)	1.17	.32
6	14.05 (2.46)	14.97 (2.96)	1.25	.33
7	14.82 (3.38)	16.14 (2.70)	2.21	.44
8	15.42 (2.83)	16.25 (2.69)	1.02	.30
9	17.13 (2.08)	17.79 (1.64)	1.44	.36
10	13.74 (2.73)	14.85 (2.96)	1.70	.39
11	14.52 (3.58)	16.20 (2.48)	3.58	.57
12	9.26 (4.69)	14.04 (3.20)	17.25***	1.24
13	11.49 (2.91)	14.65 (3.34)	11.17**	1.00
			t(43)	
Final	112.38 (21.39)	144.93 (24.92)	4.47**	1.38

Note. +Cohen's (1988) guidelines: .2 small; .5 medium; .8 large effect. *p < .05, **p < .01, ***p < .001, two-tailed.

Results of the ANOVA are provided in Table 4. There was a significant main effect for type of delivery, F(1,45) = 3647.63, p < .001, $\eta^2 = .16$ (all tests of significance were two-tailed), indicating that if all other variables were ignored, online students scored higher than onsite students. Additionally, there was a significant main effect for type of test, F(12, 540) = 21.53, p < .001, $\eta^2 = .32$. There was also a significant test by type of delivery interaction F(12, 540) = 3.50, p < .001, $\eta^2 = .07$.

Table 4: Analysis of Variance Results for Type of Delivery and Tests

Source	*df*	*SS*	*MS*	*F*
Between subjects				
Delivery	1	303.40	303.40	8.48*
Error	45	1609.82	35.77	
Within subjects				
Test	12	1495.17	12.60	21.53**
Test x Delivery	12	242.79	20.23	3.50**
Error	540	3124.71	5.79	

Note. $^{*}p < .01$; $^{**}p < .001$, two-tailed

The focus of this analysis concerned only the differences between the two types of deliveries (i.e., online vs. onsite) for each examination. As such, the follow up concentrated only on the simple main effects for A (delivery) at levels of B (test).

Analysis of the Simple Main Effects for Method of Delivery at Each Test

Results of the analysis of the simple main effects are summarized in Table 3. Cohen's (1988) d is provided for each comparison as an effect size. Cohen provided the following operational definitions for d: .2 small; .5 medium; .8 large effect. It can be seen that online students scored higher than onsite students in all tests with the exception of Test 4. Significant differences were found in Tests 2 (d = .70), 3 (d = .61), 12, (d =1.24), and 13 (d =1.00). (Information concerning significance is provided in Table 3.) The largest difference was for Test 12, where Cohen's d indicated that online students scored 1.24 standard deviations higher than onsite students.

Of the remaining non-significant comparisons, Tests 5 – 10 had effect sizes ranging from .32 - .44 indicating moderately low effect sizes. Test 11 (d = .57), had a medium effect size. Only tests 1 (d = .19) and 4 (d = .24) yielded small effect sizes.

Final Examination

The final examination for the course was worth a total of 200 points. Two onsite students did not take the final examination under the same conditions as the rest of the class and were subsequently dropped from the analysis. One took the test late. The other student elected to take the exam at the Student Service Center because of a disability, although he completed all tests in the same manner as the rest of the class. This resulted in 17 onsite students and 28 online students for a total N = 45.

Independent Samples t-test

An independent samples t-test was conducted to determine if online and onsite students performed differently on the final. (Note: This analysis was done separately because of the vastly different metrics between the final and the other exams.) Scores on the final ranged from 60 – 200 (M = 132.64, SD = 28.32). Students taking the final online scored significantly higher (M = 144.93) than the onsite students (M = 112.38) who took the paper and pencil version of the test, $t(43) = 4.47$, $p < .001$, $d = 1.38$. The 95% confidence interval for the mean difference of 25.40 was 18.37 – 46.73. Cohen's d illustrated the online students scored almost 1.40 standard deviations higher than the onsite students, indicating an extremely large effect (Cohen, 1988).

Multivariate Analysis of Variance

A 2 (type of delivery) X 7 (category of question) multivariate analysis of variance (MANOVA) was completed to assess the relationship between type of delivery and type of question. The seven categories of questions included the AACSB's Analytic, Ethical, and Reflective, and Bloom's Remember, Understand, Analyze, and Apply.

Correlational analysis among the predictor variable revealed several correlations $r = .80$ or greater between categories of Bloom's taxonomy and the AACSB groups suggesting multi-collinearity. All correlations are provided in Table 5 and descriptive information in Table 6.

Table 5: Final Examination Intercorrelations Among the Seven Categories of Types of Question

	Analytic	*Ethical*	*Reflective*	*Remember*	*Understand*	*Analyze*
AACSB						
Analytic	--					
Ethical	.26	--				
Reflective	.65***	.22	--			
Bloom's						
Remember	.98***	.35*	.64***	--		
Understand	.38**	.09	.35*	.26	--	
Analyze	.49***	.06	.81***	.48***	.25	--
Apply	.55***	.31*	.78***	.55***	.31*	.27

Table 6: Final Examination Means+ of the AACSB, and Bloom's Taxonomy as a Function of Method of Delivery

	Online ***n = 28***	***Onsite*** ***n = 17***
AACSB		
Analytic	.74	.54
Ethical	.84	.82
Reflective	.64	.58
Bloom's		
Remember	.76	.57
Understand	.59	.54
Analyze	.63	.56
Apply	.68	.60

Note. Individual items were scored 0 = incorrect, 1 = correct. +Means indicate the percentage of correct responses

It was reasonable to conclude these highly correlated categories were essentially tapping into the same construct. As a result, the three AACSB categories were dropped from the analysis resulting in a 2(type of delivery) X 4 (Bloom's taxonomy) MANOVA.

Box's M was not significant indicating the assumption of homogeneity of covariance matrices was met, M (10, 5326.73) = 11.74, p = .40. Additionally, the log determinants were very similar ranging from -14.29 to -14.66, also indicating the assumption was met.

All multivariate tests of significance indicated a highly significant effect of type of delivery on the outcome variables, V= .51, F (4, 40) = 10.24, p < .001, Λ =.49 (all tests of significance were two tailed), signifying online and onsite students scored systematically different on the taxonomy classifications and levels of difficulty. From a multivariate perspective, this indicated the presence of one linear combination of the dependent variables that significantly discriminated between the online and onsite students. Wilk's Lambda indicated that 51% of the variance in that linear combination was explained by type of delivery.

MANOVA Follow up

The follow-up to the significant MANOVA was conducted in two stages. First, a series of univariate ANOVAs was performed to further explore the differences between online and onsite students on the outcome variables. Second, a discriminant function analysis was performed to determine the nature of the multivariate relationship between taxonomy classification and difficulty across the two methods of delivery.

Univariate ANOVAs. Four one-way ANOVAs were conducted to ascertain if the online and onsite students differed on the Remember, Understand, Analyze, and Apply questions. Given that four separate ANOVAs were run, a Bonferroni correction for Type-1 error rate was conducted to maintain a family-wise error rate of .05. This resulted in an a priori $\alpha = .013$ for each comparison. As seen in Table 7, the univariate ANOVAs revealed the only significant difference between the onsite and online students was in the category of remember, with the online students outperforming the onsite, $F(1, 43) = 31.33$, $p < .001$, $d = 1.72$. According to Cohen's (1988) guidelines, this is an extremely very large effect.

Table 7: Final Examination One-Way Analysis of Variance for Effects of Method of Delivery on Six Dependent Variables

Variable and Source	*SS*	*MS*	*F(1, 43)*	*Cohen's d+*
Remember				
Between Groups	.39	.39	31.33*	1.72
Within Groups	.53	.01		
Understand				
Between Groups	.02	.02	.45	.21
Within Groups	2.06	.05		
Analyze				
Between Groups	.05	.05	1.04	.31
Within Groups	1.92	.045		
Apply				
Between Groups	.07	.07	1.20	.34
Within Groups	2.35	.06		

Note. +Cohen's (1988) guidelines: .2 = small; .5 = medium; .8 = large effect. **p* < .001. All tests were two-tailed

Discriminant function analysis, In order to examine the multivariate relationship between type of delivery and type of question, a discriminant function analysis with taxonomy of question predicting type of delivery was performed. With only two groups, there was only one discriminant function, which was significant, Wilks' $\Lambda = .49$, $\chi^2(4, N = 45) = 28.91$, $p < .001$,

rc = .71. Table 8 lists both the function and structure coefficients.

Table 8: Correlation of the Predictor Variables with Discriminant Functions (Function Structure Matrix) and Standardized Discriminant Function Coefficients for the Significant Discriminant Function

Predictor Variable	*Correlation with Discriminant Function (Structure Matrix)*	*Standardized Discriminant Function Coefficients*
Remember	.84	1.36
Understand	.15	.01
Analyze	.12	-.41
Apply	.10	-.54

The structure coefficients were examined to interpret the meaning of each function Huberty & Olejnik, (2006). The structure coefficients indicate how well each raw score correlates with each discriminant function score and serves to describe what the function represents Tabachnick & Fidel, (2007). It can be seen from the structure coefficients listed in Table 8 that Remember is doing the most to discriminate between the online and onsite students. The Analyze and Apply questions are also contributing to the discrimination between the two groups, but to a much lesser extent. The means of each category of question across the two groups are illustrated in Figure 3.

Figure 2. Posttest Comparison. This figure illustrates the comparison of posttest scores for onsite and online students.

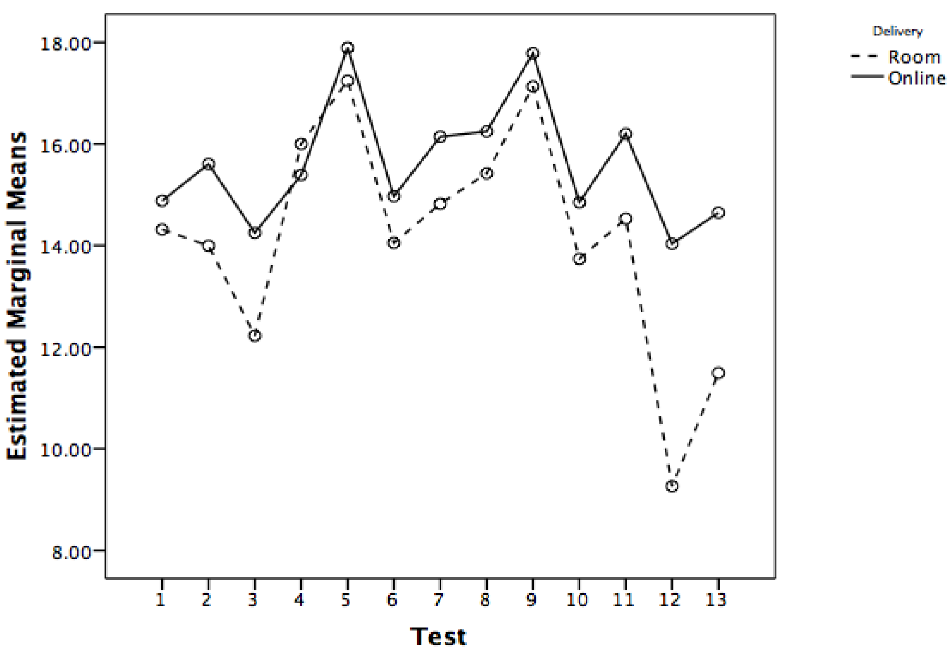
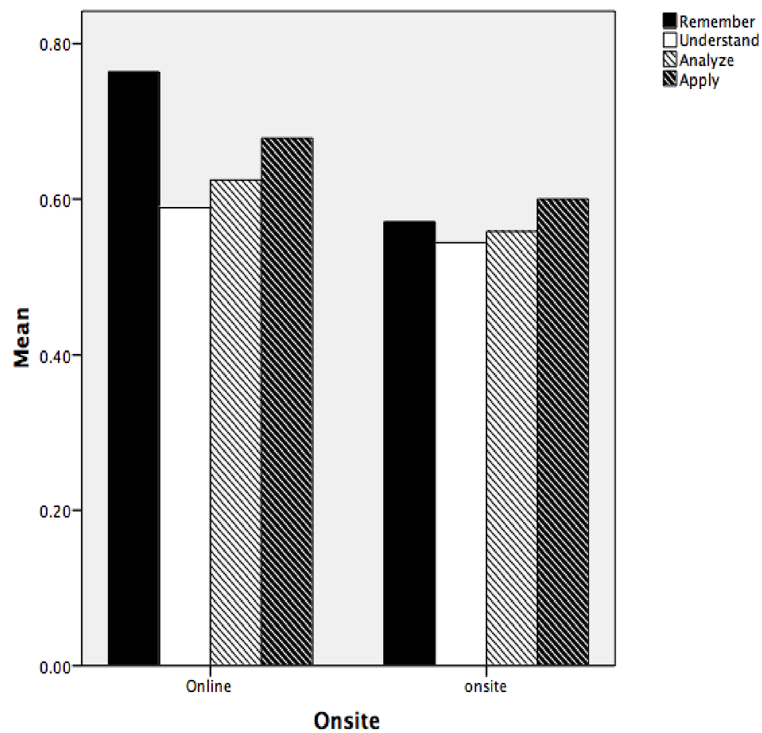


Figure 3. Delivery Comparison. This figure illustrates the comparison of the categories of final examination items for onsite and online students.



DISCUSSION

The research data analysis results indicate a difference in student test scores between students taking the test online and students taking the test onsite in the traditional manner of paper and pencil with no use of aids allowed. The students taking the test online had higher test scores, with the exception of one test, as a class than students taking the test in the classroom in the traditional manner. When the onsite students took tests 12, 13 and the paper and pencil final exam in the classroom the test scores between online students and onsite students widened significantly, as shown in Figure 2.

One explanation of the difference in the scores of online and onsite students was not the occurrence of cheating but a more relaxed environment in which the online students found to take the test compared to the classroom environment of the onsite students. However for the environments to account for the difference in the test scores the effect should be spread evenly across all of the types of questions. The difference in scores was largely attributable to the "remember" type question and not the other type questions as shown in Table 6 and Figure 3. Answering correctly a "remember" question predominately depends on being able to recall or look up the answer. Answering correctly the other types of questions characteristically depends on analyzing, assembling constructing or applying to arrive at an answer and thus looking up the answer is more difficult, if not impossible.

Another possible explanation, the online students were smarter and better test takers. The online students test scores, with the exception of one test, were higher, as shown in Figure 2. However, both the online and onsite students were taking the test online up until test 12 and 13 and the final exam when the onsite students were required to take test 12, 13 and the final exam in a proctored classroom using paper tests and pens. The difference in online tests scores and the paper and pen tests scores for test 12 and 13 and the final exam increased significantly as shown in table 7. Most of the difference was associated with the "remember" type questions.

The research results show a correlation between a series of class average tests scores and how the test was delivered; online or paper and pen. With online test associated with higher scores. Why higher test scores in the context of the research environment with online testing? Initially the possible difference in testing environments and the possible difference of intellectual ability of totally online students and classroom students seem plausible explanations in test scores of online and paper and pen tests takers. However, examination of the question type results, specifically the "remember" type questions make both environment and ability differences less than convincing explanations. Cheating remains as an explanation.

Does online testing cause cheating on test? The research results only show a correlation not a cause. Online testing, depending on the parameters, provides opportunity to cheat. Opportunity with need/reward and rationalization/attitude, are the conditions that predicate cheating behavior Becker et al., (2006); Ramos, M., (2003).

Online tests parameters in this study were the first six opportunity prevention techniques listed in Figure 1 as computer software settings. They are: (1) produce a unique test for each student by selecting questions randomly from a large test bank (2) a limited amount of time from starting to finishing the test was available, (3) the test could be taken only once, (4) required completion of the test once started, (5) one question viewable at a time, back tracking to previous questions not permitted, (6) the test question sequence was shuffled between students and in addition the computer was locked (unavailable) for other uses. All of the software settings are recommended by Harmon, Lambrinos, & Buffolino (2010). The course syllabus contained the university's student code of conduct and it was discussed the first week for both online and onsite sections. None of the online tests or final test were proctored in this study.

In this study the software settings by themselves were not sufficient in reducing the difference between online and onsite class scores to an insignificant level. However the results of data analysis found that using fewer questions in the first category of Bloom's (1964) levels of learning, the remember category and more from the understand level would reduce the difference in online and onsite student scores. Multiple choice questions that were a mixture of levels of Bloom's first four levels of learning were used in the tests and final in this study. The greatest dispersion in the online and onsite student test scores, as shown in Figure 3, was in Bloom's first level of learning; remembering information. Bloom's learning taxonomy has the most basic level of level of learning at the first level. Understanding follows in level two and then applying, analyzing, evaluating and creating. Each successive level requires more complex and abstract thinking. The results from the data analysis of this study point to the reduction of cheating by using questions that address learning above Bloom's level one. Thus this study reinforces others' conclusions (Rudner, 2010; Harmon, Lambrinos, & Buffolino, 2010): Cheating is more difficult when the answer cannot be easily looked up but has to be developed by using problem solving and reasoning skills.

The results of this research study indicate for faculty to reduce cheating in online testing they will need to go deeper into the cheating opportunity prevention list of techniques in Figure 1 and use prevention techniques in the other two predicating conditions of cheating as well. The techniques available beyond those researched in this study depend on more than just instructors for success. O'Neill and Pfieffer (2012) conclusion from econometric modeling of 700 student responses from three U.S. liberal arts colleges was, "…unless an honour code is embraced by the college community, the existence of an honour code by itself will not reduce cheating." Other groups will need to take an active role. Faculty that use the first eight items in the "cheating opportunity reduction" category and the first two items in the other two categories employed the most direct and least time and cost demanding techniques.

Does the desire exist to reduce cheating in online testing? Harbin and Humphrey (2012) contented that six groups have conflicts of interest and are willing to ignore or see online cheating through lenient eyes. The groups are students, faculty, higher education administration, legislators, parents and support groups, and for-profit online universities. If, however, online cheating is to be reduced it will require participation from the groups mentioned.

The difference in online and onsite students' test 12, 13 and final exam scores were statistically significant. The significant difference in test scores maybe evidence of online and onsite students viewing the tests and final from the perspective of Campbell's Law. Campbell's Law states "The more any quantitative social indicator is used for social decision-making, the more subject it will be to corruption pressures and the more apt it will be to distort and corrupt the social processes it is intended to monitor." (Campbell 1976). On the student level Campbell's Law might be stated as "The semester grade is more important than learning and demonstrating achievement of learning therefore I will cheat for the grade if there is an opportunity.” The non-proctored online student test takers had the opportunity.

The difference in online and onsite students test scores on tests 12, 13 and the final exam seems to result from one major difference in the test environments of the two classes. The online test environment was non-proctored and the onsite test environment was proctored. Future research should focus on the use of proctoring to maintain the academic integrity in online and onsite testing environments. For instance, a recommendation concerning proctoring that should be researched comes from Harmon, Lambrinos, & Buffolino (2010). Based on the results of their study, they recommend that when proctoring of all tests is not practical that an alternative to reduce cheating is proctoring of some tests. Likewise proctoring services, networks and software deserve additional study and support with resources if they are found to be effective in reducing the conditions identified as necessary for fraud and cheating. How many techniques to prevent cheating do faculty use at most colleges? How many do they need to use to keep cheating in check? How many are they willing to use?

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