

WEB BASED DELIVERY OF MIS COURSE: IS ONLINE TESTING CONDUCTIVE TO CHEATING?

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ABSTRACT

An online upper division undergraduate MIS course has been designed and delivered over consecutive five semesters to a sample of over 300 students. The same course was also delivered in a web-enhanced version (paperless course with regular classroom lectures). This paper reports on a study, which attempts to answer numerous questions regarding impact of an e-learning format on a quality of educational experience. Specifically, in this part of a study we will try to find out whether online testing with an open book format is encouraging cheating among students and what is the difference in online testing and assessment between students in web based (fully online) class versus web enhanced class.

INTRODUCTION AND LITERATURE REVIEW

E-learning is becoming increasingly dominating delivery format for training and education. It has been widely adopted by the corporate world as it is extremely cost effective in delivery of internal corporate training [1]. The same can not be said about education – especially higher education, where objectives of instructional activities are broader and more complex than objectives of typical training. Also, universities seem to have more problems with incorporating this new technology into an overall strategy and business processes since – ironically – they are more resistant to change [2]. Hodgins (2002) in his vision paper developed for the American Society for Training and Development (ASTD) emphasized “Assessment and Certification” as one of the main areas where impact of technology on e-learning has to be closely monitored and controlled [3]. Similarly, Dobbs (2002) in his definition of the state of online learning is concentrating on four fundamental obstacles to high quality of e-learning. Number one problem identified by him is a flawed perception that “reading is learning”. He is suggesting that more interaction is built into the e-learning as well as effective assessment mechanism [4].

Assessment seems to be an important part of study in the area of designing and evaluating online learning environment like the one proposed by Hoffman and Ritchie (2001) [5]. However, its impact on the quality of educational experience is hardly ever measured and assessed in empirical settings. At the same time some authors warned against Digital Doctrine that greatly overestimates impact of technology on economy and education (see – Albrecht and Gunn, 2000) [6]. Some anticipate that dot-com bust could be repeated with disappointments in the field of e-learning, due to irreplicability of some important components of face to face learning process.

This paper reports on empirical study addressing some of those major concerns about the impact that web based format of instruction may have on a quality of education delivered at university level.

METHODOLOGY AND PRELIMINARY DATA ANALYSIS

A sample of 230 students took an upper division undergraduate MIS course, which was delivered fully online using Blackboard 6 – a comprehensive e-learning environment. At the same time another 186 students took the same course with the same instructor and using the same text book but in a web

enhanced mode. Web enhanced mode is defined here as a paperless class with all materials, handouts and communication delivered in a digitized form (using Blackboard content), with all tests administered online but with students still participating in a traditional lectures in classroom settings.

Experiment Design

A sample of total 416 students took 12 quizzes and 2 tests during one semester upper division MIS course. This means that total number of graded assignments (quizzes and tests) used in this study is equal to 5824. It has been insured that the level of difficulty was uniform for all students by using the same pools of questions, the same textbook and the same time frame for the assignments.

Variables and Treatments

Blackboard environment provides numerous settings for designing of an online test. Every design could be more or less conducive to cheating. Combinations of settings (type of feedback and randomization) allowed us to create set of treatments.

Those treatments represented arrangements under which cheating during an open book online quiz or test could be either very easy or very difficult. A variable that was measured for every treatment was an average (class mean) score on a given test or quiz with specific format. It was assumed that - should students abuse an online format for testing – the mean of scores should consistently drop as we move from “easy to cheat” treatments to “difficult to cheat” treatment. In other words – if there was any abuse of online testing among students it was expected that difference between the mean scores will be statistically significant as we compare different combined shown in Table 2 below.

SCO-NR	show answers; the same set of questions
DRNA_NR	show missed questions but no correct answer; the same set of questions
SCA_NR	show only total score; the same set of questions
SCO-R	show answers; randomized questions
DRNA-R	show missed questions but not correct answer; randomized questions
SCA-R	show only total score; randomized questions

TABLE 1. COMBINED SETUPS FOR DELIVERY OF ONLINE ASSIGNMENTS

It is reasonable to assume that above formats (assessment setups) represent an increasing degree of difficulty in cheating, therefore treatments from the first row to the last may be viewed as a scale of increasing “degree of difficulty in cheating.”

Tests

Primary focus of this analysis was on the issue of searching for statistically significant difference in the mean scores on online assignments administered under different settings, which were more or less conducive to cheating and abuse by the students.

The first test was conducted using One-Way ANOVA F-test for verification of significant difference in the mean scores on assignments administered with different level of **feedback** (treatments). Null hypothesis H_0 about equal means on scores obtain in assignments delivered with different level of feedback could not be rejected even at $\alpha = .05$ with critical value of $F=1.77$ and $p\text{-value} = .1759$. Post hoc Tuckey analysis of p-values for pairwise t-tests confirmed this result.

Lack of impact of type of feedback on the mean score is clearly visible on the Fig. 1 below.

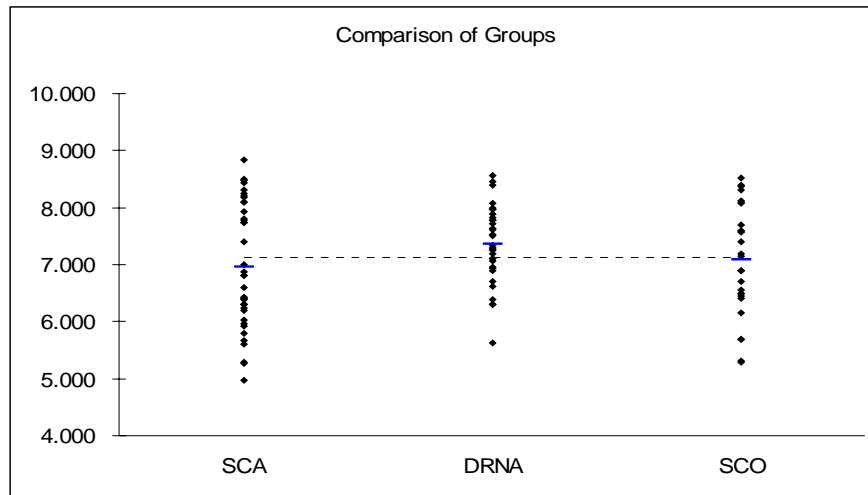


FIG. 1 DISTRIBUTION OF MEANS OF SCORES BETWEEN THREE LEVELS OF FEEDBACK

Similarly, One-Way ANOVA F-test was used for verification of significant difference in the mean scores obtained on online assignments administered with different form of **randomization** (treatments). Surprisingly, mean scores on assignment with and without randomized questions shown even more uniformity. Null hypothesis H_0 about equal means on scores obtain in assignments delivered with and without randomized questions could not be rejected even at $\alpha = .05$ with critical value of $F=0.60$ and $p\text{-value} = .4406$.

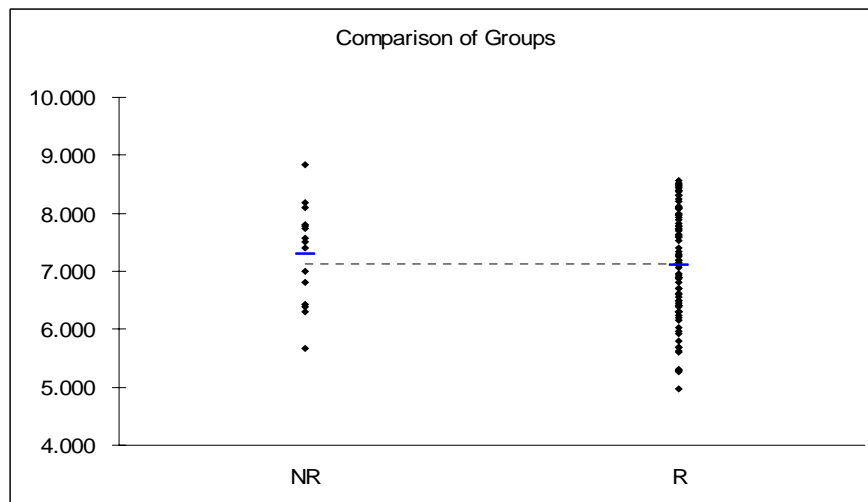


FIG. 2 DISTRIBUTION OF MEANS OF SCORES BETWEEN TO TYPES OF QUESTIONS RANDOMIZATION

Lack of impact of questions randomization on the mean score is clearly visible on the Fig. 2 above. Post hoc Tuckey analysis of p-values for pairwise t-tests confirmed this result.

The next test utilized Randomized Block Design experiment with blocks identified as two different forms of **randomization** and treatments as three levels of **feedback**. Its intention was to remove any variance between investigated means that could be possibly caused by the fact that some assignments used randomized questions and some did not. Again, statistically solid uniformity of means was confirmed.

Combined impact of feedback and randomization on the means of scores is shown below in Fig. 3.

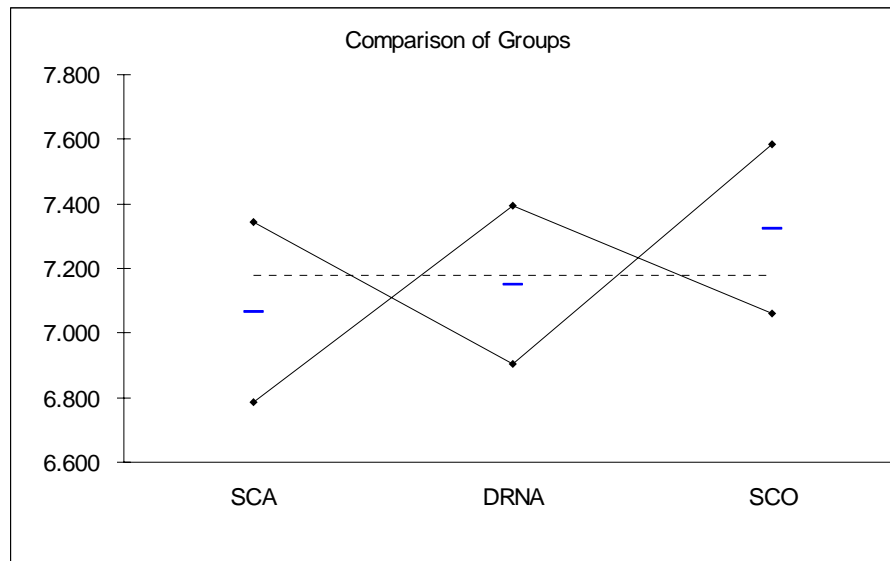


FIG. 3 COMPARISON OF IMPACT OF FEEDBACK AND RANDOMIZATION ON MEAN SCORES

Finally, the Two-Way Analysis of Variance experiment was conducted with one factor (1) defined as a **form of instructional delivery** (web-based versus web-enhanced) and another factor (2) defined as a levels of **feedback**. A purpose of this test was to establish if an additional factor such as specific format of a class (web-based versus web-enhanced) played any role in distribution of means of scores.

It seems that mean scores are much more spread out in the web-enhanced classes then in web-based classes. Moreover, the feedback type that seems to deliver lower mean is SCA-R, which is “showing correct answer in a randomized questions test”. One possible explanation could be that there are some attempts of sharing the answers between students, which without adjusting for randomization could have an adverse effect on the score. This however needs more study and by no means is changing the fact, that there is no statistical base to imply any difference between the means of the scores due to cheating.

Preliminary Results

Preliminary results seem to contradict couple of myths to which academic community seems to prescribe:

- in general, delivery of quizzes and tests in an online/ open book format does not have statistically significant impact on increase in scores,

- it appears that making answers to questions available to students right after completion of an assignment (treatments SCA) does not have statistically significant impact on average score regardless if questions are randomized or not,
- randomization of questions when delivering an online quiz or test has no impact on statistically significant difference in the means of scores,
- there is no significant difference between the mean scores of online tests between web based (fully online) students and those using web-enhanced format, which would imply that a better chance for cooperation in the classroom settings does not necessarily translates into cheating when taking online tests. However, bigger spread among means for web-enhanced format requires some more studies (like the one completed by Chia-I Chang, 2003) and may be an indication for some ever so misguided cooperation between students taking online tests [7].

CONCLUSIONS

An overall conclusion should perhaps be formulated in the following way: an average student taking an online class is less mischievous and interested in cheating as he/she is overworked and ill organized. Cheating and abusing online testing environment can be easily made very time consuming and difficult by an instructor. Randomization of the questions seems to have a minimal effect on mean scores, whereas revealing answers upon completion of the assignment does not increase possibility of cheating.

This study is on going and covers period from Fall of 2003 till present. Therefore, it will be possible to reformulate it in the future into longitudinal study and observe possible changes in the mean scores over time.

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