# Supervised e-Learning is a “MUST”

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## Abstract

## Introduction

One of the courses taught in Faculty of Computers and Information Sciences in Mansoura University of Egypt is “Information Systems Analysis and Design,” a course which utilizes different features of learning and e-learning activities. One of the activities is online assessment. Though online assessment is not the only criteria to qualify students, it is still an important feature because of the many advantages of enhancing learning experience, automated assessments marking, assessments and assessments’ items analysis, and students’ profiles features. However, one of the problems that prevent us from taking full advantage of online assessments is when students leak the assessments to others—in other words, cheat. Students search online for the questions and answers, and unfortunately, they can generally find them easily enough. Screenshots of questions, answers, final grade of those answers, and attendance date of the exams often come up in search results. Of course, it is students’ choice to seek and use this information, or not. Online assessments are not conducted in a secure and supervised environment. The argument is that distance learning is based on the ability to provide different types of activities for remote students that they can complete in their own time and environment.

Tracking, analyzing, and mining online assessments data and results of this course for the last three years reveals important facts about unsupervised learning environments, specifically unsupervised online assessments. During assessment results’ analysis, some surprising facts became clear. For one, there were a noticeable number of students who finished the assessment in less than 10 minutes and scored higher than 30 out of 50. Different types of questions were utilized for the different assessments. Those questions are very well prepared; some of them are available via the resources available from the book author(s), and the rest are prepared internally. It was shocking to find that number of students with high grades in an almost “not enough time to read the questions” is high. Luckily, the students do not know that the system records their starting time and ending time, and thus total time, or they would have at least spent more time on screen just pretending to be read and think through each question. In order to take a closer look on quizzes’ data, students were categorized into six groups based on the time consumed within each quiz. Table 1 presents the different groups in this paper. Table 2 presents data about the conducted unsupervised online assessments used in this paper, and details of each group belonging to each quiz.

Table 1: Different Students Groups

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| **Group 0** | Students started but did not complete the assessment. |
| **Group 1** | Students conducted the assessment in duration between 0 and 10 min. |
| **Group 2** | Students conducted the assessment in duration between 10 and 20 min. |
| **Group 3** | Students conducted the assessment in duration between 20 and 30 min. |
| **Group 4** | Students conducted the assessment in duration between 30 and 40 min. |
| **Group 5** | Students conducted the assessment in duration between 40 and 50 min. |
| **Group 6** | Students conducted the assessment in duration between 50 and 60 min. |

Table 2: Detailed Quizzes' Statistics

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|  | 1st 2008 | 2nd 2008 | 1st 2009 | 1st 2010 | 2nd 2010 | 3rd 2010 | 4th 2010 | 5th 2010 | 6th 2010 |
| Enrolled Students | 223 | 223 | -- | 212 | 212 | 212 | 212 | 212 | 212 |
| Online Students | 183 | 162 | 91 | 167 | 170 | 166 | 160 | 155 | 153 |
| Quiz Title | Quiz 1 | Quiz 2 | Quiz 1 | Quiz 1 | Quiz 3 | Quiz 4 | Quiz 5 | Quiz 6 | Quiz 7 |
| Total Marks | 50 | 50 | 50 | 50 | 50 | 25 | 50 | 50 | 50 |
| Time Average | 19.8 min. | 18.7 min. | 19.8 min. | 24.8 min. | 26.4 min. | 7.8 min. | 22 min. | 17 min. | 15.4 min. |
| Marks Average | 34 | 39 | 30.5 | 39.5 | 39 | 22 | 35 | 43.6 | 42.8 |
| Total No. of Questions | 50 | 50 | 50 | 50 | 50 | 20 | 50 | 50 | 50 |
| Types of Questions | T/F | T/F | T/F | T/F | MCQ | Match | Mix | Mix | Mix |
| Overall Difficulty Level | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium |
| T/F Questions | 50 | 50 | 50 | 50 | 0 | 0 | 20 | 20 | 20 |
| Easy T/F Questions | 5 | 4 | 5 | 5 | 0 | 0 | 2 | 2 | 3 |
| Medium T/F Questions | 35 | 44 | 35 | 35 | 0 | 0 | 14 | 17 | 17 |
| Hard T/F Questions | 10 | 2 | 10 | 10 | 0 | 0 | 4 | 1 | 0 |
| Multi Choice Questions | 0 | 0 | 0 | 0 | 50 | 0 | 10 | 10 | 10 |
| Easy MCQs | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 1 |
| Medium MCQs | 0 | 0 | 0 | 0 | 39 | 0 | 8 | 9 | 8 |
| Hard MCQs | 0 | 0 | 0 | 0 | 8 | 0 | 2 | 1 | 1 |
| Match Questions | 0 | 0 | 0 | 0 | 0 | 20 | 20 | 20 | 20 |
| Group 0 | 4 | 9 | 0 | 29 | 21 | 5 | 14 | 14 | 13 |
| Group 1 | 52 | 46 | 32 | 23 | 22 | 130 | 36 | 37 | 44 |
| Group 2 | 63 | 52 | 22 | 40 | 33 | 23 | 41 | 63 | 66 |
| Group 3 | 28 | 29 | 20 | 34 | 37 | 7 | 37 | 25 | 17 |
| Group 4 | 11 | 11 | 4 | 13 | 26 | 1 | 13 | 7 | 8 |
| Group 5 | 14 | 5 | 7 | 14 | 20 | 0 | 7 | 5 | 3 |
| Group 6 | 11 | 10 | 6 | 14 | 11 | 0 | 12 | 4 | 2 |

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| Figure 1: Time Distribution for 1st Quiz / 2008 | Figure 2: Marks Distribution for 1st Quiz / 2008 |
| Figure 3: Time and Marks Relevance for 1st Quiz / 2008 | Figure 4: Group Percentage for 1st Quiz / 2008 |
| Figure 5: Time Distribution for 2nd Quiz / 2008 | Figure 6: Marks Distribution for 2nd Quiz / 2008 |
| Figure 7: Time and Marks Relevance for 2nd Quiz / 2008 | Figure 8: Group Percentage for 2nd Quiz / 2008 |
| Figure 9: Time Distribution for 1st Quiz / 2009 | Figure 10: Marks Distribution for 1st Quiz / 2009 |
| Figure 11: Time and Marks Relevance for 1st Quiz / 2009 | Figure 12: Group Percentage for 1st Quiz / 2009 |
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**Problem Domain Analysis**

My study holds the analysis results of the first assessment, which is not too different from the second assessment. Figure 1 shows the percentage of students with variant assessment completion times. There were 223 students enrolled in this course (in the academic year 2008-09) with 209 online active users. The number of students who attended the first assessment is 182.

**Figure 1. Percentage of students per assessment time**

Students can be classified into seven groups based on the assessment time as presented in Table 1. What I noticed that was alarming was almost two-thirds of the students conducted the assessment in less than 20 minutes.

**Table 1. Different Students Groups in this Study**

**Total assessment duration**

**Group 1**

0 -- 10 min.

**Group 2**

10 -- 20 min.

**Group 3**

20 and 30 min.

**Group 4**

30 and 40 min.

**Group 5**

40 and 50 min.

**Group 6**

50 and 60 min.

**Group 0**

Students started but did not complete the assessment and will not be mentioned anymore in this study

Additionally, the grade average of each group was calculated, and again the results clearly indicate something vastly different from what we would expect. Figure 2 depicts the average of the six groups; notice that the averages are almost the same. That means there are students who solved the assessment in less than 10 minutes with marks close to – and in many cases exceeding -- those took close to an hour.

**Figure 2. Bar Graph of Marks Average Per Different Student Groups**

To be sure about the grading issue, I conducted further analysis on the results and found that: the number of students from all groups who scored between 0 and 10 out of 50 is (zero), and the number of students from all groups who scored between 10 and 20 is only (one).

Figure 3 shows the different counts of different groups for marks between 20 and 30.

Figure 4 and figure 5 shows the different number of students with marks between 30 and 40, and 40 and 50 respectively.

**Figure 3. Number of students who scored between 20 and 30, categorized by group.**

**Figure 4. Number of students who scored between 30 and 40, categorized by group.**

**Figure 5. Number of students who scored between 40 and 50, categorized by group.**

**Cheater’s Tips**

To combat cheating, it helps to know how students are pulling it off. Here are some cheating tips I have witnessed myself or discovered through monitoring students:

* Access to Answers’ Files: Open the PDF or document file of the assessment, search for keywords, and immediately apply answers. Most students have high memorable capabilities regarding mapping questions and answers.
* Collaborative Solution: Though collaboration is really important in the learning process, the concept of collaborating to cheat was wholly new to me. More than one student conducts the assessment. One holds the laptop, while others hold different pages of material or a long list of assessment answers from all previous exams. Consequently, they optimize their search time. The one holding the laptop reads the question aloud while the others conduct a search for the answers, finding it in no time. Part of the problem here is that in an unsupervised e-learning environment, there is no way to guarantee that students themselves even attended the assessment.

Two categories of students must not be neglected in reviewing this matter:

* Careless students: Some students don’t even read the assessment questions. They pick an answer and they don’t care about the results. There are students who answered 50 questions in less than 3 minutes, which gives them an average reading of 3.6 seconds for each question. Another form of careless was presented in 4 students (out of 182, which is about 2 percent) who did not finish the assessment even though they started it.
* Disengaged students: Almost 23 percent of the enrolled students (41 out of 223) did not attend any of the e-learning activities. This percentage is huge, and in our course, it is not acceptable at all. Motivating students to attend e-learning classes and activities is always a challenge.

**Proposed Solution and Conclusion**

Based on the findings, it is clear that there are issues that shall be considered before providing students with online exams. There must be a stronger way of controlling the exam process; in order to make marks more trustworthy. Proposed solutions are to first conduct more studies about the efficiency and effectiveness of assessment, both educational/pedagogical and technological.

**Pedagogical Solutions**

Pedagogical solutions include attempting to present an unlimited assessment items repository, and track students’ progress during the learning process, so peaks can be determined, and they might be a mark for inappropriate activity during the learning process. Also, a timed question is almost a must in the exam process. Timer shall not only start after the student sees the question; we are thinking about calculating time for both displaying and solving the question, so theoretically, students will never find the time to cheat.

This paper proposes some tips that can be used as solutions that focuses on four aspects of the online assessment process and can be thought of as the integration of the four of them:

1. Questions-based solution. Assessments banks should consist of a larger number of questions with the chance to have a quarter or third of the assessment different for each student. Also, instructors shall work on updating assessments’ banks and keeping it out of the students’ reach.

2. Environment-based solution. This solution is complementary to the aforementioned one. Supervised e-learning environments are important and are the only way to guarantee a certain accepted level of learning quality. Students can find the time to search the answer files because they simply have the access to them. Hopefully when students don’t have access to such files, they might learn better.

3. Assessment-based solution. This solution would use a timer that forces students to read questions before viewing the answers. Maybe by forcing student to wait for answers before s/he can choose one of them will be a catalyst for the student to read the question thoroughly and consider all the answers.

4. Student-based solution. Talking to students about the importance and benefits of e-learning activities is important. Not all students yet believe in e-learning; only 182 out of 223 cared about attending the online course activities. The rest needs to be told explicitly, instead of being neglected.

Nowadays, most students do their best to play it smart, even if they will not follow the rules. Instructors need to think about solutions to guarantee learning efficiency and effectiveness regularly. Unfortunately, students usually adopt and master technology for their purposes (even cheating) very quickly. Instructors need to evaluate regularly and rely more on student performance analysis tools to find facts that are not clear to us.

**Technical Aspects of the Solution**

Technical solutions are a real challenge. There is no web-based assessment system that provides a perfect solution. Rather, solutions lie in a well-controlled desktop application that must be used in the exam. Desktop applications that are not available via Web-based systems include:

* **Keyboard hooking:** Desktop application can control keyboard strikes on a system basis; not on an application basis. We can control which keys are available for students to click, and which are not. However, such a solution is applicable for Microsoft Windows-based desktop applications only; because Java Virtual Machine (JVM) doesn’t provide such control over operating system, and that will stop authors from developing a platform independent exam desktop application.
* **Operating system log file:** Desktop application can check the operating system log file, and when it finds that student executed any of the non-authored applications during the exam, it exits the exam. However, students can be smart enough to use two computers: one for taking the exam and another for looking up answers. Besides, checking the log file will be a time-based process that is not guaranteed to take place anytime.
* **Check running processes:** Desktop application will check the running processes on the system before and during the exam, and will exit any non-exam required process that is running during the exam. This technique seems to be the most appropriate one; however building this list of processes will take time and effort.

By combining the aforementioned techniques; both educational and technical, we might get a better circumstances during exams, and hopefully results will be available soon “after applying the exam to students, recording and analysing statistics.”

**About the Author**   
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