

RESEARCH ARTICLE

Medical Students' Acceptance of Online Assessment Systems

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Objective: The increased use of computers in education lead to computerized assessments, especially web-based assessment systems. The aim of this study is to evaluate students' acceptance of being evaluated using an online web-based assessment system. **Methods:** A transversal study was performed where a sample of students that used and were accustomed to an online assessment system were asked to fill in a short questionnaire and evaluate its use. **Results:** The questionnaire items responses show students' preference for online assessment, as opposed to other assessment forms, like oral examination or classical pen and paper examination. Also it is noticeable the increase in the student number that prefer the online assessment as we move up through one year of study to the next. **Conclusions:** The study revealed a high level of acceptance for the online multiple choice questions test as an assessment method. Students' opinion is that online tests are better suited for knowledge assessment and are more objective.

Keywords: online system, assessment, medical students

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Introduction

One of the most important parts of the educational process, usually the last part, from a student point of view, is the knowledge assessment [1]. The increased use of computers in education and the embracement of e-learning [2] lead to computerized assessments, especially web-based assessment systems [3-5]. Even non-standard forms of assessment have an ascending trend, especially in United States [6]. However, there are only a few studies that aim to assess students' degree of acceptance of this new online testing environment [7,8], although, from a teacher's point of view, we can clearly identify the advantages of using an online assessment system: a better security, no need to print the tests, the results can be made available immediately after the student finishes the test [5].

The aim of this study is to evaluate students' acceptance of being evaluated using an online web-based assessment system. According to the revised Bloom's taxonomy [9], this assessment system would address the cognitive domain of learning, more specific the "remembering" and the "understanding" levels. Miller, in his work [10], describes a pyramid of clinical assessment. The online assessment system used in this study is situated at the base of the pyramid, the "cognition" level, assessing the "knows" and the "knows how" elements.

Materials and methods

A transversal study was performed where a sample of students that used and were accustomed to an online assessment system were asked to fill in a short questionnaire.

Summary description of the assessment system used in the study.

The assessment system consists of a web application that is hosted and runs on the University servers. Application specifications are:

- items presented during the evaluation are multiple choice questions (MCQ), with one or more correct answers. A single question is visible on student's screen at any given time. The question contains the question body and five answers.
- the system can offer a timed or an untimed test.
- the system is built with intrinsic security measures, such as question and answers randomization order.
- there are three correcting algorithms available, each teacher would choose one at the beginning of the testing session:
 - "all or nothing": the student is awarded the points for that question if all the correct answers and only those are identified.
 - "partial with wrong items": the student receives points according to the number of correct and incorrect answers he/she identifies.
 - "partial without wrong answers": the student receives points if he/she selects only correct answers, a single incorrect one would reset the question value to 0.
- at the end of the test, the student can view his/her grade and the test revision, if the teacher allows it
- the test results can be downloaded in CSV format (comma separated values).
- the system offers test statistics valuable for teacher's self-evaluation.

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This assessment system and an improved version of it have been used in our University for seven years, by faculty members teaching students from all 6 years of study.

The analyzed sample consists of 240 general medicine students, 40 from each study year. We selected at random 3 student groups from each study year. Only general medicine students were included in the study because this is the only study program that uses the assessment system throughout the entire 6 years duration. Each individual was asked to fill in a questionnaire containing 7 items with closed answers. The translated questionnaire is presented in table I:

The statistical analysis was performed using EpiInfo, free software distributed by U. S. Center for Disease Control

and Prevention. The analysis includes descriptive statistics elements, such as frequencies, and chi-squared tests. Every performed test used a 0.05 significance level.

Results

The responses for questionnaire items from the entire sample are presented in tables II and III.

We considered necessary to test for associations between students' year of study and responses for each item in questionnaire. The results are displayed in tables IV and V. Items 2 and 3 were excluded because the entire sample gave the same answer and no statistical analysis could be performed.

Table I. Questionnaire items

Item no	Item	Answers
1	Does your graduated high-school profile include "Informatics"?	Yes / No
2	Are you familiar with other knowledge assessment methods?	Yes / No
3	Did you use other online assessment systems, beside the one used in our University?	Yes / No
4	Which examination method do you think is more secure, with a less chance of someone cheating for a better grade?	Oral / Pen and paper / Online examination
5	Which examination method do you think is better suited for determining student theoretical knowledge level?	Oral / Pen and paper / Online examination
6	Which examination method do you think is more objective?	Oral / Pen and paper / Online examination
7	Do you think that being able to see your grade and your revised test immediately after you finish is an advantage of using this system?	Yes / No

Table II. Items with YES/NO response

Item	YES		NO	
	Frequency	Percent	Frequency	Percent
1. Does your graduated high-school profile include "Informatics"?	55	22.92%	185	77.08%
2. Are you familiar with other knowledge assessment methods?	240	100%	0	0%
3. Did you use other online assessment systems, beside the one used in our University?	0	0%	240	100%
7. Do you think that being able to see your grade and your revised test immediately after you finish is an advantage of using this system?	210	87.50%	30	12.50%

Table III. Items with Oral / Pen and paper / Online examination response

Item	Oral examination	Pen and paper examination	Online examination
4. Which examination method do you think is more secure, with a less chance of someone cheating for a better grade?	39 (16.25%)	32 (13.33%)	169 (70.42%)
5. Which examination method do you think is better suited for determining student theoretical knowledge level?	30 (12.50%)	43 (17.92%)	167 (69.58%)
6. Which examination method do you think is more objective?	38 (15.83%)	24 (10.00%)	178 (74.17%)

Table IV. Variable associations for study year and items 4, 5 and 6

Item and responses		1st year	2nd year	3rd year	4th year	5th year	6th year	p value
Item 4	Oral examination	10	8	6	5	4	6	0.36
	Pen and paper examination	8	7	6	5	4	2	
	Online examination	22	25	28	30	32	32	
Item 5	Oral examination	9	7	5	4	2	3	0.04
	Pen and paper examination	11	9	8	7	6	2	
	Online examination	20	24	27	29	32	35	
Item 6	Oral examination	10	9	7	6	5	1	0.01
	Pen and paper examination	8	6	4	3	2	1	
	Online examination	22	25	29	31	33	38	

Table V. Variable association for study year and items 1 and 7

Item and responses		1st year	2nd year	3rd year	4th year	5th year	6th year	p value
Item 1	YES	8	9	10	10	9	9	0.99
	NO	32	31	30	30	31	31	
Item 7	YES	33	33	34	35	37	38	0.41
	NO	7	7	6	5	3	2	

Discussions

The current study is focused only on the advantages the online MCQ assessment may have over other assessment methods. Unlike other studies [11,12], it does not take into the account other variables such as students' personality type that would incline toward a specific assessment form.

The questionnaire items responses show students' preference for online assessment, as opposed to other assessment forms, like oral examination or classical pen and paper examination. Also it is noticeable the increase in the student number that prefer the online assessment as we move from one study year to the next. A possible explanation is the fact that the students get accustomed to the system over the years. The answers to item 1 (Does your graduated high-school profile include "Informatics"?) rule out a possible sample bias, because there is no difference in the students ratio with an informatics background ($p=0.99$).

In addition, the variable association analysis finds a significant increase in the number of students, from one year of study to the next, that consider the online assessment to be better suited for objectively determine the knowledge level, as seen from the responses from items 5 and 6. These findings contradict other studies that showed a disfavor for students that were evaluated using MCQ test compared to an oral examination [13].

Questionnaire item 2 was used to validate questions 4, 5 and 6 that make reference to other assessment methods, making sure that online assessment was not the only method the students were familiar to.

The present study is limited by the fact that no other similar assessment system was used by the students, as seen in the answers from item 3. It is possible that using other software solutions might shift the answers toward other assessment methods.

Conclusions

The study revealed a high level of acceptance for the online MCQ test as an assessment method. This level of accept-

ance is increasing as we move up on the years of study. Students' opinion is that online MCQ tests are better suited for knowledge assessment and are more objective.

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