COMMENTARY

Computer Based Examination: The Need of the Time at DUHS

Ata Ur Rahman and Syed Moyn Aly

INTRODUCTION

Dow University of Health Sciences (DUHS) Karachi is one of the budding institutions moving with high pace. There is a gross increase in number of students and number of assessment sessions held each year. Latest module based integrated system is further increasing the work load. This involves the full faculty in terms of time and energy, which are of great value and needs priority in utilization. The consumption of time leads to disturbance in education process also.

There is lot of paper work and use of stationery in the traditional assessment system. There is extra ordinary continuous burden of summative assessment on examination department. This consumes valuable portion of budget also. The situation is demanding a need to change.

STATEMENT OF PROBLEM: The traditional system is full of multiple problems and need to be replaced by updated computer based assessment system. It is an important qualitative shift with maximum transparency with minimum human interference.

The objective of this position paper is to explore the possibility of conducting computer based Examination at DUHS.

REVIEW OF TRADITIONAL SYSTEM: The traditional paper based examination consists of following steps:

Before Examination Day

1. Establish Question Banks: It is hectic process while doing it manually.

2. Issuance of Admit cards. It is based on demographic data, enrolment and examination roll numbers.

3. Selection of questions based on Table of Specification. It is rarely followed; most of time selection made by examiners becomes the final Table of Specification.

Department of Orthopaedic, Dow University of Health Sciences and Civil Hospital Karachi, Pakistan.

Correspondence: Dr. Ata-ur-Rehman, Professor and Chairman, Department of Orthopaedic, Dow University of Health Sciences and Civil Hospital Karachi, Pakistan.

Email: drataortho@yahoo.com

4. Preparation, printing, binding and packing process of papers and copies.

On Examination Day

5. Movement of candidates from their residence to examination hall at least half an hour before start of examination.

6. Transportation of paper and copies to examination hall.

7. Sitting arrangements of candidates to avoid cheating.

8. Briefing sessions about how to behave as invigilators.

9. Movement of invigilators to examination hall at least one hour before examination and stay at least half an hour after examination.

10. Paper distribution and Invigilation. Recollection of examination copies and papers and their counting to ensure all copies have been received back.

11. Transportation back to examination department.

12. Counting and recounting of copies at various stages.

Post Examination Activities

13. Coding of examination copies. Paper checking (Marking).

14. Result sheet development and announcement. Appeal for rechecking.

15. Disposal of hard documents of papers and examination copies.

The above steps are very much prone to breach at any stage. This also involves heavy resources in terms of manpower and finances.

REVIEW OF LITERATURE: The computer is emerging as an essential part of life. It is providing an infrastructure in every field of life. It is now widely used in training as well as in assessment in developed and developing countries. It has been widely used and multiple evidence present covering multiple aspects. In 1999, computer-based test administration was introduced in USMLE,[1] and paper-and-pencil tests were phased out. Step 1 is now of one-day, of 350-item, step 2 is also of one-day, of 400 items and step

3 remains a two-day examination, consisting of 500 items. The computer based testing component is 1250 items. NBME is assessing approximately 25,000 examinees annually in a network of regional centers. NBME research[2] indicated that in certain applications, the computerization of multiple-choice questions (MCQs) had no demonstrable effect upon item difficulty. Pearson correlations were calculated. The overall Pearson correlations between the computer based MCQ and paper based MCQ scores for obstetrics-gynecology and surgery were .72 and .73 respectively. Ayo in a study[3] of Nigerian University, 81.3% of the applicants were computer literate, while the remaining 18.7% were guided through the examination. The total number 1023 (75.7%) of respondents who participated in the e-Examination conducted in Covenant University took electronic examination for the first time and as such found the examination easy, a few found it a little challenging but adjusted with time. 327 (24.2%) of the applicants had not been involved in any form of electronic examination before, and found it difficult. Singapore medical schools have adopted Computer based testing since 2004 at undergraduate and postgraduate medical education. Earl[4] studied their preference to different format of papers in computer based test; it is ranging from 55-80 %. On the other hand their preference to traditional paper and pen was ranging from 9-26 %. The reasons for their preference were independence from seating position, better image quality and the fact that CBT allowed them to proceed at their own pace.

Saad[5] compared Computer-based testing vs paper-based testing in a TOFEL test. It was concluded that the testing mode has almost no significant effect on the overall validity and reliability of the tests. A cross-sectional survey of 301 medical students for their preparedness for computer-based testing in USMLE was held by Lynch.[6] They completed a self-administered questionnaire. Students' perceived preparedness for computer-based administration of high-stakes examinations may be facilitated by preparing them for examination. Most respondents owned a computer (70.4 percent), had access to a computer (98.5 percent), and had an e-mail address (94.8 percent).

Gary[7] at the University of New South Wales, Sydney studied effect of online formative assessment on learning. The results support the contention that Integrated well designed online formative assessments can have significant positive effects on learning. Web-based formative assessments also support equity and inclusiveness by allowing students to attempt each assessment anonymously on multiple occasions, at any time.

In another study Rotthoff[8] randomized 146 fourth year medical students into two groups. Long Menu Questions or Open Ended Questions were administered in computer based testing. Results showed that they did not differ significantly with regard to the level of difficulty, performance and response times. Compared to standard multiple-choice questions (MCQs), the response time for Long Menu Questions and Open Ended Questions is longer. This proves that multiple format of assessment method may be used easily in computer based testing. A cohort of 350 physiology students at St. George's University were surveyed[9] to find out the response of online quiz on summative assessment. The students who chose to use formative online quizzes generally had better outcomes on summative examinations. Formative online quizzes had predictive validity for subsequent summative examinations, indicating that quizzes have the potential to be useful learning aids to help students perform better on summative course assessments.

Preliminary analysis[10] suggests that exposure to the online formative assessment methods has a positive impact upon participation in online summative assessment methods. At University of Heidelberg in a study[11] of 98 students, 36 (37%) of the students chose the computer-based examination and 62 (63%) chose the paper-based examination. There were only very few students (5%) who denied the computer-based option. Voluntary computer-based examinations lead to equal test scores compared to a paper-based format. By providing reliable information and a proper preparation of the students for the exam via an introduction to the software, a CBE could be a good method to conduct written examinations efficiently and fairly.

PROPOSED CHANGES: There are three areas to focus.

1. Make the process simple and user friendly
2. Facilitate and motivate students and trainers.
3. Conserve time and budget.

For students Computer Based Examination consists of following steps:

1. Log on to computer.
2. Enroll on software and give your identity and password.
3. Generate the paper and solve it.
4. Get the result.

How computer based examination will improve the system: The Internet revolution has completely modified the way of education business. There is a

significant impact in the assessment field. Online testing is becoming the popular methodology among students and teachers. Like all other methodologies, Computer based testing has its limitation, merits and challenges.

A. Scope of e-Examination:

Summative assessment of a large number of students can be carried out with expansion of digital laboratory.

B. Modes of Testing:

Intranet Based Online examination: It may be useful for most parts of summative assessments. The Moodle (a free, open-source web application for producing modular internet-based courses) has been successfully used in medical summative assessments.[12] Other sources are also available on variable terms and conditions.

C. Time management

It provides opportunity for faculty to determine professional priorities in time management. It gives more output in Minimum time. It provides a lot of flexibility in examination schedule.

D. Results:

It provides immediate results. It leads to automatic grading, Computerized marks sheets. It also increases the transparency of results.

E. Validity and Reliability:

This is the important aspect to judge. There is hope to improve considering following points: The literature supports[5] that there is no effect on validity and reliability. However further research is needed. The further research can be based on following grounds. Statistical analysis is simplified in computer based testing. It can also simplify vetting of modifications in tests for validity or reliability.

F. Cheating:

In paper based examination, sitting arrangements in halls are very much prone for cheating. The Order of questions is monotonous.

The potential for cheating during an online test is also a difficult challenge.[13]

Open book computer tests with time constrains are useful.

It can be minimized by intranet online testing or controlled computer laboratories.

It can be minimized by time allocation per question or by software time limitation options.

The computer based testing may give an option for randomization and minimize the chances of cheating in same sitting arrangement.

G. Invigilation:

It is minimized by randomized distribution of test questions. There is some need of IT personnel to sort out technical support in any problems.

H. Feedback:

There is no system of feedback on individual question in paper based examination. MCQs without proper review are prone for any ambiguity, spell and grammatical mistakes. Feedback option can be created in Computer based testing very easily. It provides immediate and bilateral feedback.[14]

I. Financial Aspect:

There is an early investment in terms of equipments and programing.

Later on maintenance charges are minimal.

Per candidate running expenses decreases remarkably with increase in number of candidates and increase in number of examination sessions.

There is a lot of saving from the budget of stationary and printing.

J. Examination Department.

Electronic item bank[15] with dynamic updating based on item response in examination.

Will be set on an automatic program with minimum manual human interference.

Automatic formatting of questions and options.

Online testing can make testing more easy and efficient.

Test Creation can be made very simplified.

Administrator has a privilege to create, modify and delete the test papers and its particular questions at short notice.[16]

Test Result Analysis is effective and quick based on statistical analysis software.

Improvement of test materials in the light of feedback and item behavior.

Online data storage facilitates testing management increasing the security of test and results.

More sophisticated test item can be introduced.

K. Students:

Convenience for students in terms of time and place.

Test giving is very comfortable and minimizes tensions.

Self assessment is easy and focus can be made on problem areas.

Repetition is unlimited. Open for 24 hours for self assessments.

Progress Report can be monitored.

Flexible scheduling with floating-procedure. Book exam: on-demand-testing.

Open-book examinations with access to the internet.

L. Security:

There is little chance of a security breach, as only the "webmaster" in charge of the examination would have access to the paper. The risk of hacking can be minimized in intranet settings.

M. Innovation and Creativity:

It is an additional future window.

1. Computer Based Adoptive Testing:[2]

This is very useful for formative assessment.

The student is exposed to a sample of questions.

The results identify the weak areas of students.

More elaborative testing can be done on the weak areas.

The results of the sample also identify the level of students.

This determines the base line for testing the candidate to a higher level.

2. Value based marking system:[17]

Every question has variable importance and value in terms of marking. It is very difficult to mark it manually in paper based examination. Its importance is of much significance in high stake examinations. The computer based examination can provide solution to variable scoring.

3. Computer-based simulations have been used in USMLE.

4. More sophisticated test items

5. Sequential Testing:[2] These are ways of shortening testing time or increasing testing accuracy by making decisions about how much more testing is required while portions of the examination are still being administered.

6. Images and audio videos can be used freely.

7. Internet-Based Standardized[18] Patient Simulation with automated feedback is a good method of self assessment.

N. Connectivity Problems

Continuity of connectivity can be a serious challenge of online testing. It can drop at any time for various reasons. This may lead to incomplete or defaulted testing. This can be a serious source of distraction and disturbance for student. Its compensation in terms of time out is very important. It can be addressed by proper backup of equipments.

O. Other Constrains and challenges

More difficult to safeguard against cheating behavior in internet based online examination. Hacking, item security[19] and other security issues to be considered.

"Digital Equity"[20] Limitation in using assessment tools. The main disadvantage has been increased anxiety amongst those unfamiliar with computer use. Students have varying levels of experience with computers. Requires computer literacy.

Technological capacity of institution to support CBT.

Initial creation of tests may be more complex and will require faculty motivation.

Incompatibilities in browsers can create display problems

Computer or user error may destroy results

Requires research into online test validity and reliability.

Item Randomization effect[21] still poses a threat. The students facing difficult item at early stage may be on disadvantage.

CONCLUSION

The first step to change the mind set is the most important. Initial expenses look a little more but it is a safe investment. Later on there is very smooth progress towards conduction of examinations in a very minimal cost. There are a lot of prospects for innovation. Public perception as "behind the times" needs to be addressed and it is the "need of the time". The application of computer based testing in assessment has a bright leading future for Dow University of Health Sciences.

REFERENCES

1 Melnick DE, Dillon GF, Swanson DB. Medical licensing examinations in the United States. J Dent Educ. 2002; 66:595-9.

2 Clyman SG, Julian ER, Orr NA, Dillon GF, Cotton KE. Continued research on computer-based testing. Proc Annu Symp Comput Appl Med Care 1991:742-6.

3 Ayo CK. The Prospects of e-Examination Implementation in Nigeria. Turkish Online Journal of Distance Education-TOJDE 2007; 8: Article 10.

4 Lim EC, Ong BK, Wilder-Smith EP, Seet RC. Computer-based versus pen-and-paper testing: students' perception. Ann Acad Med Singapore 2006; 35:599-603.

5 Saad Al-Amri. Computer-based testing vs. paper-based testing: a comprehensive approach to examining the comparability of testing modes. Essex Graduate Student Papers in Language & Linguistics 2008; 10:22-44

6 Lynch DC, Whitley TW, Emmerling DA, Brinn JE. Variables that may enhance medical students' perceived preparedness for computer-based testing. J Am Med Inform Assoc. 2000; 7:469-74.

7 Velan GM, Jones P, McNeil HP, Kumar RK. Integrated online formative assessments in the biomedical sciences for medical students: benefits for learning. BMC Med Educ 2008; 8:52.

8 Rotthoff T, Baehring T, Dicken HD, Fahron U, Richter B, Fischer MR, et al. Comparison between Long-Menu and Open-Ended Questions in computerized medical assessments. A randomized controlled trial. BMC Med Educ. 2006; 6:50.

9 Kibble J. Use of unsupervised online quizzes as formative assessment in a medical physiology course: effects of incentives on student participation and performance. Advan Physiol Edu 2007; 31:253-60.

10 Fitkov-Norris E. Online assessment and study habits: does it add up to better performance in quantitative modules? Access at: http://www.srhe.ac.uk/conference 2011/abstracts/0180.pdf

11 Hochlehnert A, Brass K, Moeltner A, Juenger J. Does medical students' preference of test format (computer-based vs. paper-based) have an influence on performance? BMC Med Educ. 2011; 25;11:89.

12 Inuwa IM, Taranikanti V, Al-Rawahy M, Habbal O. Perceptions and Attitudes of Medical Students towards Two Methods of Assessing Practical Anatomy Knowledge. Sultan Qaboos Univ Med J. 2011; 11:383-90.

13 Watters MP, Robertson PJ, Clark RK. Student perceptions of cheating in online business courses. Access at: http://www.aabri.com/NC2011Manuscripts /NC11064.pdf

14 McKimm J, Jollie C, Cantillon P. ABC of learning and teaching: Web based learning. BMJ. 2003; 326:870-3.

15 Peter Cantillon, Bill Irish, David Sales. Learning in practice. Using computers for assessment in medicine. BMJ Volume 329-11 September 2004

16 VIJAY INDORIA, PRASHANT SHARMA and ANOOP SONI. Project Report On "ONLINE EXAMINATION" International School of Informatics & Management Formerly India International Institute of Management

17 http://www.elearners.com/guide/faq-glossary/elearning-faq/what-are-the-pros-and-cons-of-online-education/

18 Nielson JA, Maloney C, Robison R. Internet-based standardized patient simulation with automated feedback. AMIA Annu Symp Proc. 2003:952.

19 Friedrich Scheurman & Julius Bjornsons. The Transition to Computer Based Assessment. Gerben van Lent. Risks and Benefits of CBT versus PBT in High-Stakes Testing Introducing key concerns and decision making aspects for educational authorities. 2009. P-83-92

20 Martha Thurlow, Sheryl S Lazarus, Debra Albus, Jennifer Hodgson. Computer based testing: Practices and consideration.

21 Anthony M. Marks, Johannes C. Cronje. Randomised Items in Computer-based Tests: Russian Roulette in Assessment Marks, A. M., & Cronje, J. C. (2008). Randomised Items in Computer-based Tests: Russian Roulette in Assessment. Educational Technology & Society, 11 (4), 41-50.