Design and Implementation Procedure for Administration and Evaluation in E-Marking-System

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Abstract: In the near future, a pervasive digitization environment can be expected based on the recent progresses and advances in computing and programming technologies. Next generation of evaluation system is transformed from manual evaluation process to digitization evaluation process. The digitization evaluation process is called E-marking system. This E-marking system is designed for digitization of the evaluation process so that we can reduce the errors in the evaluations process and can release the results in more easy way. This paper describes how the digitization is done to evaluation process by giving its related research background including the concept, features, status, and applications of E-marking system. Some of the technical challenges that have been faced during the development process of E-marking system are also presented.

Keywords: digitalization evaluation processes, E-marking system, digitalization environment, computing, programming technologies.

I. INTRODUCTION

Many awarding organizations consider that significant benefits are derived from the introduction of technical systems and services to support assessment processes after an examination has been set. The benefits claimed for e-marking systems include:

- Enhanced process control
- Improved access to wider examiner expertise
- Enhanced communications and support across the evaluator's team
- Richer data on examiner, candidate, item, component and paper performance
- Reduced time to result
- Raised marking quality/consistency
- Reduced administrative error.

However, without close matching of the technical system and the assessment process, and without careful introduction to engage appropriate stakeholders benefits remain theoretical. This paper begins by describing the objectives of a project and its approach adopted to design solution, to ensure it was assessment led, setting out the key features of the solution generated together with lessons learnt. It reports the approach taken for system introduction across a series of

evaluation sessions, ensuring both that a new system could be tested and trailed, also protecting key evaluation sessions. Finally it gives an overview of the results of research by the awarding body following this approach.

II. LITERATURE REVIEW

The rapid growth of computer technology usage in education fields and workplaces is inexorable. Although technology offers potential to broaden educational assessment beyond what traditional methods allow, there are inevitable concerns during a transition phase (where assessments exist in both paper- and computer-based modes) that their outcomes are not comparable. From the review of comparability studies since 1993 notes, the transition from paper- to computer-based evaluation cannot be taken for granted and that comparability between the two testing modes needs to be established through carefully designed empirical work.

Comparability studies explore the possibility of differential effects due to the use of computer-based evaluation instead of paper-based evaluation. These studies help ensure that test score interpretations remain valid and that students are not disadvantaged in any way by taking a computerized evaluation instead of the typical paper evaluation.

Gathering reliability measures is one significant practical step towards demonstrating the validity of computer-based evaluation during the transitional phase.

There are a number of primary issues for comparability research. One of these is whether the computer introduces something unintended into the evaluation-taking situation. In the context of assessing essays on screen, this might demand an enquiry into construct validity; exploring whether the same constructs or qualitative features of essay performance are being attended to by assessors in the different modes. Computer-based and paper clerical evaluation had the same predictive validity. They found that 'valid and reliable data can be gained through online ability evaluation' while comparing online and paper-based evaluation. Arguably these issues have heightened importance since the development of the ongoing program.

III. OBJECTIVE

A leading organization had expressed an interest to provide a comprehensive electronic marking system that supports its current high quality delivery of examinations and would allow it to improve the effectiveness and efficiency of standardization.

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So they initiated a project to design a generic solution for digitalization processes that would enable the awarding body to meet its aims. The main objectives of this project were to:

- Improve the quality of evaluation process, including both the quality and accuracy of the marking and the reduction of lost data in the process.
- Improve the overall efficiency, accuracy and effectiveness of evaluation process.
- Demonstrate the capability by successful processing of large number of examination scripts
- The solution to be developed over an year with the aim of completing a large scale pilot within that time.

IV. THE E-MARKING PROJECT

The aim of this project is to convert the paper based marking system to online digitalized system. The project is divided into different modules so that there is a rapid development in the project outcomes. This paper deals about the administrator module and its functionalities for the process of evaluation with onscreen marking system.

A. Modules in the Administrator

The administrator is again divided into sub modules and possesses different functionalities for the evaluation processes they are

- Add/delete/edit subject
- Add/delete/edit/evaluators
- Assigning subjects to evaluators
- Scanning and adding scripts
- Allocating scripts to evaluators
- Adding marks to schema
- Generating reports
- Uploading sample scripts
- Reports

1) Designing of Administration module

The designing part of the administration module involves the designing of the following screens they are

- Designing of login screen
- Designing of Home screen
- Designing of "Add Subject" screen.
- Designing of "Add Evaluator" screen.
- Designing of "Assign subject to evaluator" screen.
- Designing of "Add sample scripts" screen.
- Designing of "Add student scripts" screen.
- Designing of "Add maximum marks to schema" screen.
- Designing of "Allocate scripts to evaluator" screen.
- Designing of "Reports" screen which have two more buttons.
1. "Reports summary "button.
2. "Marks Summary" button.
- Designing of "reports Summary" table and screen.
- Designing of "Marks Summary" table and screen.

a) Designing of login screen

The login frame has two text fields for entering the username and the password in addition to these two text fields it has a button "Login" so that whenever the user enter his username and password and press the login button the home page will be displayed to the user.

b) Designing of Home screen

The Home frame has nine buttons those are
1. Add Evaluators
2. Add/edit/delete subjects
3. Assign Subjects to Evaluator
4. Add sample scripts
5. Add Student scripts
6. Add maximum marks to subject schema
7. Allocate scripts to evaluator
8. Reports
9. Logout

c) Designing of "Add Subjects "screen

The "Add Subjects" frame has
- Three text field for entering the subject name, subject code and subject id that has to be added
- Five buttons for performing the action on the script of selected subject. The buttons on Add student scripts frame are
1. Submit
2. Add
3. Edit
4. Delete
5. Home

d) Designing of "Add Evaluators "screen

The "Add Evaluators" frame has
- Nine text field for entering the first name, middle name, last name, user id, password, email, phone number, role and evaluator id .
- Five buttons for performing the action on the script of selected subject. The buttons on Add student scripts frame are
1. Submit
2. Add
3. Edit
4. Delete
5. Home

e) Designing of "Assign subject to evaluator"

A. The "Assign subject to evaluator" frame has
- One text field for entering the Barcode of the script that has to be added
- Two Choice box for selecting the subject name and for selecting the evaluator who belong to selected subject
- Two buttons for performing the action of assigning the selected subject to evaluator. The buttons on Assign subject to evaluator frame are
1. Assign
2. Home

f) Designing of "Add sample scripts to subject" screen

The "Add sample scripts to screen" frame has
- One text field for entering the path of the sample script of subject that has to be added
- One Choice box for selecting the subject name.
- Three buttons for performing the action of browsing path of the sample script and for uploading the selected sample script of the selected subject name. The buttons on "Add sample scripts" frame are
1. Browse

2. Upload
3. Home

g) Designing of "Add Maximum Marks to Schema" screen

The "Add Maximum Marks to Schema" frame has

- Eight text field for entering the maximum marks for each question for every subject.
- Choice box for selecting the subject name for which subject the script belongs
- Two buttons for performing the action on the script of selected subject. The buttons on Add student scripts frame are

1. Submit
2. Home
3. Edit

h) Designing of "Allocate scripts to evaluator" screen

The "Allocate scripts to Evaluator" frame has.

- Three Combo boxes for selecting the subject name, selecting the Student scripts allotted to selected subject and to select the evaluators who were assigned to the selected subject.
- There is one button for performing the action for allocating the script of selected subject to the evaluator. The button that is present on the "Allocate scripts to Evaluator" frame is

1. Allocate.
2. Home

i) Designing of "reports screen"

The "Reports" frame has three buttons for performing the action on the script of selected subject. The buttons on Reports frame are

- Reports summary
- Marks summary
- Home

j) Designing of "Reports summary" screen

The "Reports summary" frame has one buttons and the table displaying the summary of the number of scripts that were assigned to the particular evaluator the button that is present on the "Reports summary" frame is "reports" button.

k) Designing of "Marks summary" screen

The "Marks summary" frame has one buttons and the table displaying the summary of the marks that were achieved for each question in every scripts along with subject name. The button that is present on the "Marks summary" frame is "reports" button

2) Implementation of Administration module

The administrator must add the subjects and the evaluators in the data base and have to assign the subject to the evaluator to which he corresponds. The issue that a raise here is the many to one relationship exists between the evaluator and subjects. i.e., any number of evaluators can be assigned to single subject but the vice-versa is not possible to do so. So every evaluator is restricted to one subject for evaluation that is to his corresponding subject.

The administrator must add the answer scripts that were written .The issue that a raises here is, its practically impossible to scan the scripts manually and store the data

correspondingly So here we have to use the scanner along with the barcode generator so that when the script is scanned automatically the barcode is generated for that script which will contain the scanned images, and since the barcode is unique now the administrator can easily add the answer scripts using the barcode into the database for the corresponding subjects. In case of any manual errors while adding the scripts, the administrator can edit/delete the scripts corresponding to the subject. The scriptid have to be generated automatically in the order of the serial while adding.

The administrator must allocate the scripts that were added to the particular subject and those scripts are to be allocated to the evaluators of that corresponding subject who were previously assigned. When the particular subject is selected the corresponding scripts and the evaluators for that subject have to be displayed and the scripts have to allocate to evaluators. Here again comes the issue of the many to one or one to one relationship. i.e., any number of the scripts can be assigned to the particular evaluator but any number of evaluators cannot be assigned to one script. In case of any manual errors the administrator can reallocate the scripts to evaluators.

The administrator can also award the maximum marks for the subjects that were previously added to the database. When he/she enters the number of questions in the subject the corresponding number of fields will be displayed to enter the maximum marks for each question to be awarded and then stored in database. In case of any changes to be done to the schema of marks they can be edited.

The administrator must also have the facility to check the daily details of number of scripts that were assigned to particular evaluator of corresponding subject and the summary of marks that were awarded by the evaluator for the particular question in the particular script for corresponding subject are displayed in the form of table with the option of print button.

The administrator can also upload the sample scripts of answers for the particular subject for the convenience of the evaluator during the process of awarding the marks to the scripts.

B. Evaluation module details

The main aim of this module is to evaluate the scripts of the students digitally and send their respective marks to the administrator databases.

1) Designing of Evaluator module

a) Designing of login screen

Login page in this module is similar to the admin module which is described in a of A.

b) Designing of displaying student scriptid dynamically

In this screen the student scriptid are retrieved dynamically from the databases and displayed on the buttons. To create these buttons we use the methods like validate, revalidate. We also retrieve file path of the sample scripts from the database

c) Designing of Script Buttons on screen

In this screen the scripts will be displayed on the buttons. By clicking on the buttons the

particular script will be enlarged and the evaluator can evaluate the script.

d) Designing of evaluation page

In this screen the evaluator enters the marks of the respective student in the text fields**.** This information will be stored in the databases. The maximum marks of the questions are retrieved from the database and will be displayed in the text fields.

2) Implementation of Evaluator module

Initially the evaluator logs into the login page through a valid username and password. Then based on the evaluator, the subject and the student scripts are retrieved and displayed on the screen. The scripts are evaluated by comparing to the sample scripts. After going through the scripts, when the evaluator enters the marks and submits, he should take care of the following points,

- Marks should be entered only after evaluating every script of the particular student.
- The entered marks shouldn't be greater than the maximum marks allotted for the particular question.
- Marks shouldn't be re-entered.

3) Evaluation module issues

The main problem we faced was to know who was the evaluator logged in .This information should be passed from one program to the other program for retrieving the subject and the student scripts. We have overcome this problem by using parameterized constructor. The same concept is applied while retrieving the student scripts in the other program.

V. IMPORTANCE 1OF E-MARKING SYSTEM

A. Faster and more flexible marking and script management processes

Two factors will work together to help us ensure that scripts are marked in the shortest time possible.

- Improved monitoring lets us track the status of every script throughout the process, allowing tighter management and rapid identification of bottlenecks.
- Dynamic apportionment of scripts to offsite examiners – scripts are only allocated and distributed to an examiner when he or she is ready for them, ensuring that no examiner is waiting for scripts while there are scripts waiting to be marked.

B. More efficient quality control

We can more effectively monitor examiner reliability while marking is underway, allowing us to identify and investigate problems at an early stage, when interventions can be made most efficiently.

C. More detailed feedback to centers about how their students performed

Since every candidate's mark on every question is recorded, we may provide information to centers about how well their candidates did on each question compared with other candidates. This may help centers identify strengths and weaknesses in their coverage of a syllabus. Some individual candidates (for example, those considering re-taking an examination) might also be interested in similar information about their individual performances.

D. Smooth transition to online assessment

Our customers are likely to want a mixture of paper-based and computerized evaluation for some time. The paper scanning approach allows us to use the same basic infrastructure to process both types of assessment, facilitating a smooth transition and allowing us maximum flexibility to meet our customers' needs

VI. BENEFITS

There are various benefits of on line marking, for examiners and examining bodies alike. The immediate benefits for examiners include a reduction in administration and the removal of non-core tasks, such as dealing with script collection and postage. This allows examiners to focus on the professional aspect of marking and results in increased productivity. Operationally, the time spent dealing with tracking script packets is eliminated and overall administration is reduced at the awarding body. This also contributes to increased security of scripts as they are scanned centrally and stored on the secure server. In this way, PBT marking has been very much streamlined. The design of the marking system contributes to improved quality assurance in a number of ways. Marking is anonymous as scripts are presented without the candidate and center details identified and are randomly allocated to examiners rather than being presented as a batch of responses from a particular center or country. This prevents examiners from becoming 'tuned in' to typical errors from speakers of particular language groups which may influence their marking, thus improving the fairness of the assessment.

VII. SECURITY AND QUALITY ASSURANCE

E-marking system takes the security and integrity of its tests extremely seriously and works closely with centers to ensure that the administration of examinations meets requirements and that the security of all confidential materials is maintained. The security of the examinations offered on Connect is protected by state-of-the-art encryption and an onscreen lock-down facility. Regular inspections at centers ensure compliance with all regulations. In addition to general criteria related to security of materials and conduct and supervision of the staff, an inspector visiting a computer-based exam session will also assess centers using particular criteria related to the technical equipment and support available. All this ensures that for the test taker, the exam experience is fair and-positive.

VIII. DISC1USSIONS

The assessment agencies that are responsible for administering and coordinating large groups of markers this is perhaps a positive finding since within-marker variation is more difficult to deal with than between-marker variation. Given the subjective nature of the domain in which the essays were written, between-marker variation is not a surprising finding. This type of variability reinforces the continued need for procedures, such as standardization exercises, commonly used by assessment agencies to reduce between-examiner variation levels.

This research project had a number of limitations that could have influenced the outcomes in ways that are difficult to quantify and potentially limiting to be generalized. First, examiners were only standardized operationally, and not immediately prior to this marking exercise. This might have influenced their ability to deal with scripts which had extreme characteristics or may have had an effect on their sense of responsibility and urgency (although this condition was the same for the examiners when marking in either mode).

A further limitation was that evaluator had a comparatively light marking load with a generous time allowance compared with live marking. Finally, the balance of the script sample characteristics did not necessarily reflect the balance of qualities that examiners might face during a live marking session. Therefore it is recommended that further research be carried out to investigate whether any mode-related marking effects exist when more examiners (with differing levels of expertise) mark a greater number of scripts which are lengthier, and include a wider diversity of characteristics.

IX. CONCLU1SION

The flexibility of online marking allows consideration of alternative models of marking which would not be feasible for paper-based marking. E-Marking has the capability to support item level marking with different sections of a Writing paper being sent to different evaluators, which could improve reliability of the overall marking of the Writing component. This process involves a group of Principal Examiners or Senior Team Leaders carrying out some preliminary marking with analysis carried out on the marks awarded to identify responses where there is a very high level of agreement in marks awarded. These scripts can then be fed into the marking of all examiners. Examiners blind mark these scripts as they are not identified differently to markers. Reports on the marking of these seeding scripts can be run to show which examiners are marking within any level of tolerance set, which examiners require further support to bring their marking in line and which examiners are not able to apply the mark scheme to the required level of accuracy and should not continue marking. This process could be used to either supplement, or replace, monitoring by Team Leaders and would maintain a quality focus throughout the marking period. This is currently being considered for use as part of further improvements to the Quality Assurance process.

Growth demands increased flexibility in marking and the processing of results. As with all innovations, communication and consultation with stakeholders is key to success. Future considerations in this field will continue to take advantage of the experience and expertise which evaluators hold in order to build on the success which E-marking has provided to date.

REFERENCES

1. Hansen, W. J. and Haas, C. (1988). Reading and writing with computers: a framework for explaining differences in performance. Comm. ACM. Vol. 31(9), 1080-1089
2. Harpster, J. L. (1989). Visual performance on CRT screens and hard copy displays. Human Factors. Vol. 31(3), 247-257. Johnson, M. and Greatorex, J. (2008). Judging text presented on screen: implications for validity. E-Learning. Vol. 5(1), 40-50.
3. Kurniawan, S. H, and Zaphiris, P. (2001). Reading online or on paper: Which is faster? Proceedings of HCI International 2001. Mahwah, NJ: Lawrence Erbaum Associates.
4. Mayes, D. K., Sims, V. K. and Koonce, J. M. (2001). Comprehension and workload differences for VDT and paper-based reading. International Journal of Industrial Ergonomics. 28, 367-378.
5. Bennett, R. E. (2003) On-line Assessment and the Comparability of Score Meaning (ETS RM-03-05), Princeton, NJ: Educational Testing Service.
6. Newton, P., Whetton, C. Adams, E. Bradshaw, J. and Wong, C. (2001) An Evaluation of the 2001 New Technologies Pilot, NFER.
7. [7] "ICT in Assessment: a three-legged race" Patrick Craven and RobertHarding, February2001,
8. http://www.ocr.org.uk/news/artcl34.htm
9. [8] "Schooling for Tomorrow. Learning to Change: ICT in Schools" OECD 2001 (http://www.oecd.org)
10. [9] "Evaluation of Enigma computer based examination pilot (7-9 October1997)", Trevor Dexter and AlfMassey (UCLES/RED internal report,(January 1998)