

Online Examination System: An Institutional Response to the requirements of Open and Distance Learning System

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ABSTRACT

Use of ICT applications by the Open and Distance Learning (ODL) institutions is increasing day by day. Offering of academic programmes by these institutions through online mode has become a new normal in the light of the University Grants Commission Online Regulations 2018 on offering courses and programmes. The online academic programmes can be offered at the levels of certificate, diploma and degree. This new normal necessitates the ODL institutions to implement Online Examination System (OES) for evaluation of student performance. The online examinations can be conducted in two ways i.e. proctored examinations and remotely proctored examinations given the facilities offered by the OES application. The article discusses different aspects of OES including pre-requisites, functioning, salient features, need, advantages and limitations for implementation at open and distance learning institutions in the light of UGC Regulations, 2018 on offering courses and programmes through online mode.

Keywords: Online Examination System, Online testing, Online Assessment, Open and Distance Learning Institutions.

INTRODUCTION

The advent of technology has impacted the distance education system in more than one way. While the Open and Distance Learning (ODL) activities such as pre-counselling, counselling, admissions, support services, and management of student cycle database have been revolutionised by the extensive use of ICT, the examination system also needs to move towards ICT integration to meet the expectations of the stakeholders. The examinations are the mechanism to evaluate the performance of the students on completion of a term of study and to assess their learning and mastery against different learning outcomes defined at the commencement of the session. The online examinations are the simplified version of the pen-paper based conventional examination flexible enough to scalability in order to address the number in ODL system. At times, evaluation process reflects on the impact and quality of the academic activities arranged for the distance learners.

The convention system of examination involves huge number of physical activities and manual work making declaration of the examination results on time crucial. The situation is aggravated by a large number of examinees in the ODL system as such. As claimed by Kotwal, Bhadke, Gunjal, and Biswas (2016), switching over by the ODL institutions to Online Examination System (OES) can enhance the efficiency and effectiveness of the evaluation system to a considerable extent. It will not only eliminate many of the issues facing the conventional examination system such as loss of evaluated/unevaluated answer-scripts but also

prevent loss of data making maintenance, distribution and retrieval of data easier. Otherwise also the conventional system is cost intensive in terms of time and effort. The responsibility of teaching, developing assessment tools and finally evaluating student performance is centralised in a teacher. Mojesh, Reddy, and Anudeep (2018) emphasise that the teaching and examination should be separated from the dual activities of a teacher in order to bring objectivity and transparency in the evaluation system. The OES can be used as a standardised tool for assessing the student performance. The prime objective of the online examination system is to “*effectively evaluate the student thoroughly through a totally automated system that not only reduces the required time but also obtain fast and accurate results*” (Hameed & Abdullatif, 2017). The OES can also be used to address the assessment requirements of specific disciplines at the different cognitive levels.

The ODL institutions have now started thinking towards deployment of online examinations tools keeping in view their ease of conducting examinations, managing number and declaring results within a stipulated period of time. It is fast gaining attention because of its efficacy, speed and accuracy. The studies have shown that the performance of the online examinations is equally good in comparison to the conventional pen and paper examinations. On the other hand, the former offers a number of advantages over the conventional system. A study conducted by Al-Qdah and Ababneh (2017) found that the results of the examinations conducted online are similar to those of the one conducted through conventional mode. Therefore, they advocate introduction of Online Examination System (OES) in place of the conventional mode of examination by the distance learning institutions. Desouza and Fleming (2003) also found that the OES can produce better results in comparison to the pen-paper based conventional examination system. The reliability, adaptability, security, flexibility and validity of the OES plays an important role in establishing its effectiveness and efficiency (Shraim, 2019). The article discusses the different aspects of OES including advantages and disadvantages for implementation at open and distance learning institutions in the light of UGC Regulations, 2018 for offering courses and programmes through online mode (UGC, 2018).

UGC ONLINE REGULATIONS, 2018

The University Grants Commission (2018) notified the Regulations 2018 for online courses and programmes to be offered by the educational institutions in India. A detailed framework with specific requirements for offering online programmes has been provided in the Regulations. It is specified that the institutions intending to offer online courses and programmes will strictly abide by the provisions narrated in the Regulations. The academic programmes at certificate, diploma and degree levels as recognised by UGC can be offered by the higher education institutions through online mode exclusively. Such programmes should be approved by the statutory authorities of the institution concerned as per provisions enshrined in these Regulations. A centralised Learning Management System will be required to offer the online programmes.

The institutions offering online programmes should have the ability to hold examinations “*either using technology-enabled online test with all the security arrangements ensuring transparency and credibility of the examinations or through the Proctored Examination*” (UGC, 2018). The examinations also need to be conducted strictly as per the provisions of the Regulations. The Regulations provide for establishment of examination centre for conducting examinations for online students with prescribed security and infrastructural facilities for conducting examinations. It is also mandatory for the institutions to devise a robust mechanism for authentication of online learners in order to ensure their academic integrity at the time of taking examinations. The examinations shall be conducted by such institutions in a proctored manner.

PRE-REQUISITES OF THE ONLINE EXAMINATION SYSTEM

The Online Examination System (OES) vouches for availability of a strong IT infrastructure at the institutional level. A secure data centre would be the first and foremost requirement for establishment of an OES. The seamless internet connectivity and uninterrupted electric supply are the lifeline of the system among others. In majority of the cases, the OES builds of a systematic and comprehensive online question bank. Such a question bank provides for laying of specific rules for presentation of the questions in a question paper as per a given examination pattern. The establishment of an OES requires the following in addition to maintenance and upkeep of IT functions:

- Maintenance and updating of an Online Question Bank
- Development of question papers
- Generation of database of the evaluators in case of subjective papers
- Uploading of the Answer Key in case of subjective type/ multiple choice questions
- Generation of result/score sheet of the subjective type/ multiple choice questions based on the answer key
- Acceptance of the examination forms through the system
- Creation of a database of the examinees from the Online Examination Forms
- Maintenance of the master database of the examination centres if examinations are to be conducted at designated centres in a proctored way.
- Allotment of examinees to the respective examinations centres in case of proctored examinations.
- Permitting examinees to login to the OES securely in case of distributed/remotely proctored examinations at the locations of the examinees.

The scalability of the system will be need of the hour in order to cope up with the ever increasing number of examinees session after the session. The traffic load due to simultaneous access becomes crucial when hundreds/lakhs of students appear in the examination at the same time. The following types of questions can be considered while designing a question paper for conducting online examinations:

- Objective type questions
- Multiple choice questions
- Short answer questions
- Subjective/essay type questions, and
- Free text questions.

FUNCTIONING OF THE ONLINE EXAMINATION SYSTEM

The Architecture plays an important role in efficacy and effectiveness of the Online Examination System. The design of the examination system should be such that it should be able to offer a good working experience to its users - not only the teachers who would be developing the question bank and evaluating the scripts but also the examinees. The system should have the capability to facilitate performance of different activities connected with the examination to the registered students whose complete details are available in the system. It should provide comprehensive mechanism for authenticating the credentials of the users such as retina detection and matching, bio-metric authentication, password authentication, photo image authentication, etc.

During the examinations, the questions are popped up on the system of the examinee on random basis. Consequently the seriatum of the presentation of the questions will vary for all the examinees though the pattern of questions and all other modalities will remain the same. The questions are presented on the screen one after the other. The next question will pop up on the screen once answer to the previous question is submitted by the examinee. A standard time is allotted to each of the questions and the time left is monitored with the help of a time clock ticking on the screen during the time of examination. Once the specified time is over, the system seizes to function except saving the work done so far. In case of free text/ subjective type questions, the system should provide an evaluation mechanism based on Blooms Taxonomy using rubrics so that such scripts are allotted online to the designated teachers for evaluation. The rubrics are the tested and proved assessment tools effective in evaluation of student performance in case of free-text and subjective questions. They can be customised for evaluation of higher order thinking skills in variety of ways and complexity levels (Pulist, 2001).

SALIENT FEATURES OF AN ONLINE EXAMINATION SYSTEM

The online examinations are conducted simultaneously through internet at multiple locations in a distributed manner. They can be conducted in a proctored way through designated examination centres well versed with IT infrastructure for conduct of examinations. In other case, the examinees can be allowed to appear for the examinations at the pre-specified time using their own device at their own location wherever they are. A link to the portal is provided to the examinees that would facilitate in the login process with the help of a unique ID and password after passing through the authentication mechanism successfully. The biometrics using student finger prints under camera surveillance as a mechanism to authenticate the examinee, play an important role in security control process for eliminating the possibility of cheating in the OES (Sarrayih & Ilyas, 2013). The system can be accessed with the help of a compatible browser. A standard OES is expected to have the following salient features:

- The online examination system provides connectivity to the examinees with the help of different versions/makes of devices used by the end users. The system is supposed to be user-friendly and easy to use without complications or requiring help of a manual.
- The system should be able to enable the teachers to develop new questions and edit/modify the existing questions in terms of their difficulty level, weightage and contextualise them syntactically and semantically.
- It should provide the facility to make mix and match of the questions at different levels with varied weightage and difficulty levels to devise a question paper.
- It should be able to publish the question paper keeping in view the structure, weightage and maximum time allotted to the question paper.
- It should monitor the behaviour of the examinee over the screen and restrict any undesired activity. The duration of inaction also should be recorded. It should be able to capture the streaming video of the examinee working on the system and save it in the database for later use in addition to online monitoring during the conduct of the examinations.
- The system should be able to record all the answers ticked by the examinee and the free text questions/essay type questions as database/ files for later use.
- In case of objective type/ multiple choice questions, the system should be able to evaluate the answers in bulk automatically with the help of a pre-specified answer key, and provide a comprehensive grade sheet for each

of the examinees. The result can be displaced for each examinee on screen or may be kept reserved for declaration at a later time as decided.

- The system should be able to collate the marks for free text questions awarded by the teacher on each of the components of answer sheets based on the marking scheme.
- Once the evaluation results are received, the system should be able to generate the comprehensive grade cards as per pre-defined format in case of each of the students. At the administrative level, statistics at desired level should be generated by the system for analysis purpose.
- The system should be able to analyse each and every question at component level for difficulty, length of answer, and type of skill assessed. A mechanism for moderation of the results in case of a need should also be provided by the system.

Proctored Examinations

The proctored examinations are conducted under the supervision of the invigilators. The UGC Regulations, 2018 define 'Proctored Examination' as "*conducted under the physical supervision of approved neutral person who ensures the identity of the test taker and the integrity of the test taking environment*" (UGC, 2018). The examinations being conducted by the educational institutions in the current situations are all proctored examinations. Under this system, a place designated as examination centre is identified for making seating arrangements for the examinees. The examinees are allowed entry as per the specified time for taking examination. The invigilators are appointed for monitoring purposes. The answers-scripts are received back once the examination is over.

In case of online proctored examinations, the examinations are computer based to be conducted in a computer laboratory designated as the examination centre. While the invigilators will be appointed for monitoring purposes, the CCTC surveillance system will record the activities during the examination. In such cases the examinees show their valid ID for attending the examination. The authentications of credentials of the examinee at the examination centre takes place at two levels. While the ID card and authorization to appear in the examination is checked by the invigilator available at such a designated online examination centre, the login ID and password to connect to the examination portal are authenticated by the central server. This type of examination is fully supervised and entry of unauthorized person at the centre is completely restricted during the time of examination. The online examinations being conducted by the National Testing Agency are part of proctored examination system.

Remotely-Proctored Examinations

The remote proctoring is the process through which surveillance and monitoring of the examination activities are performed with the help of web camera and microphone connected to the machine over the internet. The process enables the invigilator sitting at the central location to control online examination including authentication and authorization of examinees at a large scale. This is done through live streaming. Once authentication is successful, the examinee is allowed to start the examination as per the specified time. The examinations conducted at the place of the examinee with the help of online devices without the supervision of an official appointed by the educational institution, are part of the remotely proctored examination system. While, the screen of the system used by the examinee records type, time, and duration of each of the individual activities happening on the screen, the online camera of the system used by the

examinee, records all the activities of the examinee related to movement and behaviour, and sends to the central server in a streaming manner. Other activities on the machine are locked during the period of examination including deactivation of any screen capturing option. The head and eye movement of the examinee along with deviation from the screen are especially recorded. The recording of the examination is also available for scrutiny at a later stage with the central server. The invigilator monitoring the examination from the control room can interact with the examinee through live chat and audio, and immediately give a warning to the examinee if found performing suspicious behaviour He/She can even freeze the system for some time as a part of punishment while the system clock would keep on running. In such a case, entry and exist of the examinee from the system is strictly monitored. Douglas, Wilson and Ennis (2012) are of the opinion that the online examinations can be more beneficial if they are used as an integral part of the evaluation system as a whole along with other forms of evaluation.

NEED OF THE ONLINE EXAMINATION SYSTEM

The open and distance learning system is registering huge growth in terms of student intake session after session. Conducting examinations at that level and declaring results in a specified time poses a great challenge before them. The surge in online learning ventures has necessitated the introduction of ICT based system for assessment of student learning outcomes (Boitshwarelo, Reedy & Billany, 2017). The ODL institutions have to establish a large number of centres for pen-paper based examinations keeping in view the student strength. The examination centres are established by the ODL institutions primarily at their study centres and educational institutions affiliated to other universities for offering their programmes. At times conducting examinations for ODL institutions disrupts the normal educational activities of these institutions. The remotely proctored online examination system can address the need to establish such a large number of examination centres by these institutions.

ADVANTAGES OF ONLINE EXAMINATION SYSTEM

Being automated, online examination system enhances the transparency, reliability and authenticity of the examination process *per se*. It can evaluate the performance of the examinees expeditiously and thus, can save lot of time for the teachers that can be utilised for planning of academic activities (Bobde, Chaudhari, Gulguri, & Shahane, 2017). The establishment of an Online Examination System will entail huge onetime-expenditure on the part of the ODL institution. However, the system will be very economical subsequently keeping in view the number of students taking examinations. The system is user-friendly and cost effective for use by the teacher and the students as well. It can cater to the institutional requirement of on-demand examinations in view of its efficiency and effectiveness in the evaluation process. It can benefit the ODL institutions in the following manner:

1. The online system of examination can save on time and cost substantially on the following routine activities:

- Designing, moderation, and printing of question papers
- Sealing and packaging of the question papers in small packets
- Physical transportation of the question papers from the press to the institution and subsequently despatch to the specified examination centres.
- The system takes care of the security issues connected with the question paper printing, transportation, custody, handling, etc.

- Chances of repeating the earlier question papers are minimised.
 - Printing of huge number of main and supplementary answer sheets
 - Despatch and transportation of answer-sheets to the examination centres.
 - Collection of the answer-scripts from the examination centres, segregation and further allocation, and despatch to the respective evaluators with arrangements to receive them back.
 - Entry of the awards and grades back to the system for processing and their posting to the profile of the respective examinee.
 - In case of remotely proctored examinations at the location of the student, expenditure on the maintenance/hiring of the examination centre is also saved.
 - Traveling expenses on the part of the examinees will be one of the substantial savings in case of remotely proctored examinations.
2. The system enables the teachers to set questions that are problem oriented rather than the questions that depend on the basis of subject information. The questions should be selected in a way that they require a comprehensive understanding of the relationships and application of knowledge.
 3. Specific question-wise timing restrictions will prevent use of unfair means by the examinees. There will be no time for the examinees to search for the answers.
 4. The random presentation of questions to the examinees during examination rules out the copying of answers.
 5. In case of multiple choice questions the result can be declared and processed by the system automatically.

LIMITATIONS

While the robust Online Examination System will entail huge investment and expenditure on the IT infrastructure, there are other issues that would seek redressal on the part of the ODL institutions. Uninterrupted power supply and seamless internet connectivity is backbone of the Online Examinations System. Their availability at the server point as well as the point of examination centre/ examinee's level is very crucial. There may be issues in smooth functioning of the system at rural and remote locations for want of adequate infrastructural facilities. While the institutions may be ready to cop up with all sorts of emergency situations, sudden technical glitches on the location of the examinee may lead to system failure. Arnold (2016) has expressed a concern for the educational institutions towards eliminating the challenge of cheating in unproctored online examinations. Different security and control features of the online examination system software can be used to address this issue. Use of biometric authentication and camera controlled surveillance will enhance credibility of the online examination system and make it foolproof.

CONCLUSION

The introduction of online examination system by the open and distance learning institutions can go a long way in addressing the assessment issues arising out of huge number of students registering with them. The OES can benefit the institutions in a number of ways in terms of systemic governance, transparency,

efficiency, and effectiveness. In addition to this, the courses launched on SWAYAM follow an online format for effecting teaching and learning, and provide for proctored examinations for the registered users who would like to get certification of their courses completed through the portal on payment of a nominal fee. The ODL institutions may avail of this opportunity to integrate with the system for providing such certification after evaluating the performance of their online learners. The OES will play an important role in not only this integration but also meeting the assessment requirements of the online programmes and courses offered by the ODL institutions under the UGC Regulations 2018 on offering such programmes. Thus, the OES will offer a promising opportunity for enhancing the capacity and capability of the ODL institutions in this knowledge society driven by ICT and cloud resources.

REFERENCES

- Al-Qdah, M., & Ababneh, I. (2017). Comparing Online and Paper Exams: Performances and Perceptions of Saudi Students. *International Journal of Information and Education Technology*, 7(2), 106-109.
- Arnold, I. J. M. (2016). Cheating at online formative tests: does it pay off? *The Internet and Higher Education*, 29, 98–106.
- Bobde, S., Chaudhari, S., Gulguri, J., & Shahane, R. (2017). Web Based Online Examination System. *Global Research and Development Journal for Engineering*, 2(5), 58-61.
- Boitshwarelo, B., Reedy, A. K., & Billany, T.(2017). Envisioning the use of online tests in assessing twenty-first century learning: A literature review. *Research and Practice in Technology Enhanced Learning*, 12(16), 2-16. Retrieved from <https://telrp.springeropen.com/track/pdf/10.1186/s41039-017-0055-7>
- Desouza, E. & Fleming, M. (2003). A Comparison of In-Class and Online Quizzes on Student Exam Performance. *Journal of Computing in Higher Education*, 14(2), 121-134.
- Douglas, M., Wilson, J., & Ennis, S. (2012). Multiple-choice question tests: a convenient, flexible and effective learning tool? A case study. *Innovations in Education and Teaching International*, 49(2), 111–121.
- Hameed, M.R., & Abdullatif, F. A. (2017). Online examination system. *International Advanced Research Journal in Science, Engineering and Technology*, 4(3), 106-110.
- Kotwal, D. V., Bhadke, S.R., Gunjal, A. S., & Biswas, P. (2016). Online Examination System. *International Research Journal of Engineering and Technology*, 3(1) Retrieved from <https://www.irjet.net/archives/V3/i1/IRJET-V3I119.pdf>
- Mojesh, M., Reddy, J. A. & Anudeep, N. (2018). Research on Online Examination System. *International Journal of Electrical Electronics & Computer Science Engineering*, 11-13. Retrieved from https://www.ijeecse.com/ICSCAAIT_012.pdf
- Pulist, S. K. (2001). Student Evaluation in Online Learning, *New Frontiers in Education*, 31 (4), 494-502.
- Sarrayrih, M. A. & Ilyas, M. (2013). Challenges of Online Exam, Performances and problems for Online University Exam. *International Journal of Computer Science*, 10(1), 439-443. Retrieved from <http://ijcsi.org/papers/IJCSI-10-1-1-439-443.pdf>
- Shraim, K. (2019). Online Examination Practices in Higher Education Institutions: Learners' Perspectives. *The Turkish Online Journal of Distance Education*. 20(4), 185-196. 10.17718/tojde.640588.

UGC (2018). University Grants Commission (Online Courses or Programmes) Regulations, 2018. Retrieved from https://www.ugc.ac.in/pdfnews/7553683_Online-Courses-or-ProgrammesRegulations_2018.pdf

