

ICT-Driven Examination Reform: A Definitive Approach to Implementation CBCS Assessment Framework in India

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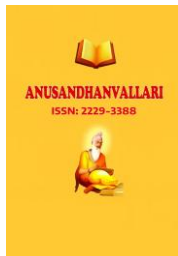
Abstract

Assessment is a crucial tool to evaluate the extent of knowledge acquisition and intellectual capability of a student for a specific course or program. The current research emphasizes a comparative analysis of the yearly examination method and semester examination system within the Choice Based Credit System (CBCS) framework. The research also highlights significant challenges encountered in conducting examinations, such as data handling for pre-examination tasks like preparing eligible students' information, managing exam centers, ensuring accurate question statistics, evaluating answer sheets, processing marks, and maintaining grade reports, all requiring manual intervention. The final solution involves creating a specialized examination management system through the incorporation of Information and Communications Technology (ICT) to convert the conventional education system into the Outcome Based Education (OBE) system by reforming the examination process. Over the past thirty years, the application of Information and Communication Technology (ICT) has significantly transformed the methods and processes of almost all activities in business, governance, and various aspects of our lives. This occurred because of the significant advancement in computer and communication technologies and the widespread use of computational devices for managing large data and information across various workplaces. Moreover, there have been substantial and economical advancements in internet technologies along with a dramatic rise in internet users. As a result, it has enabled a robust network of interconnected devices, providing access to shared resources for efficient information exchange at high speeds with excellent reliability. Over the past ten years, ICT has completely transformed societal lifestyles and has rendered many manual systems obsolete in nearly every workplace. Due to the various benefits of ICT, it can be utilized in any system that needs to manage, process, and transmit large amounts of data from sources to end users. A university assessment system that includes extensive records of students, instructors, examiners, moderators, disciplines, programs, and associated colleges. Additionally, it encompasses various procedures concerning these records, from completing examination forms to announcing results, which were executed manually prior to the advent of ICT. The current study emphasizes reforms attainable in the existing examination system through the integration of ICT.

Keywords: Examination management, Information and Communications Technology (ICT), Choice Based Credit System (CBCS), Outcome Based Education (OBE).

I. Introduction

Examination is considered as an instrument to assess overall progress of a student in a particular course. According to Maduka (1993) examination is a way to ascertain how much of a subject matter in a particular field of study the candidate has mastered. Hornby (1995) defined examination as a formal test of somebody's

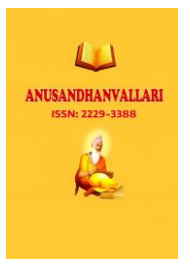


knowledge or ability in a particular subject, especially by means of answering questions or practical exercises. Balogun (1999) also noted the examination as the process through which students are evaluated or tested to find out the quality of knowledge they have acquired within a specified period. Emaikwu (2011) considered examination as a part of evaluation in education which aimed to determine a learner's level of skill acquisition or intellectual competence and understanding after a given training. The examination process maintains fairness, confidentiality, security and time bound execution of all steps to publish the result. It is an integral part of the education system which involves a series of steps including preparation of examination calendar, schedule generation and preparation of eligible lists of candidate, form fill-up, student data management for venue selection, seat allotment, invigilation, evaluation, marks processing or score management, publication of results, post publication processes *etc.* needs reform accordingly. The entire process largely depends on academic curriculum and needs reform accordingly. Components like curriculum, teaching-learning and examinations are interdependent [Radhakrishnan Commission, 1948]. The reform in examination process was first suggested in the report of Radhakrishnan Commission in 1948 after independence. The commission has put forth a strong criticism by stating that 'we are convinced that if we are to suggest any single reform in the university education it would be that of examinations'. The reforms in examination process were also suggested by Kothari Commission (1966) to improve the reliability and validity of the system. According to the Report of the Education Commission (1964-66), "The crippling effect of external examinations on the quality of work in higher education is so great that examination reform has become crucial to all progress, and has to go hand in hand with the improvements in teaching." The changing pattern of under graduate education system shows a series of transformation in general degree courses since independence. In under graduate degree programmes, it's ranging from two tier system (2+1) to three tier pattern (1+1+1) and subsequently semester system to Choice Based Credit System (CBCS) pattern of course curriculum. Recently University Grants Commission (UGC) proposed 'Learning Outcome Based Curriculum Framework for Undergraduate Education' to bring reforms in the Higher Education System to ensure the relevance of knowledge, identify skills gaps, and launched special programmes for skill development

(UGC, 2020). In the context of changing scenario in higher education system from annual mode to semester pattern, adoption of CBCS, implementation of OBE *etc.*, the examination process needs a drastic reform with special reference to integration of specialized machinery of ICT. The present study mainly emphasized on the challenges and constrains in conducting examination according to CBCS pattern of under graduate curriculum instead of adopting ICT based automated examination system to implement the concept of OBE as suggested by UGC.

II. Transformation Of Annual Mode Of Examination To Semester Mode Of Examinations

UGC had taken initiative to make a reform in academic sector by implementation of CBCS in higher education on 20.01.2015 (both for under graduate and post graduate programmes) for the holistic development of students. The concept of credit based academic curriculum was already in vogue in most of the developed countries. The CBCS pattern of curriculum shifted the whole examination pattern from annual mode to semester mode along with a diversity of choices in courses. In a simple note, it is a 'learner centric' curriculum where students can chose their options (interdisciplinary/ intra-disciplinary) as per choice *i.e.*, 'cafeteria approach' in higher education. The rules and regulations for annual pattern of three tier examination system were quite different from the CBCS mode of examination. In three tier under graduate system, students appeared in term end



examination annually, as such they got adequate time to cover their prescribed syllabus. On the other hand, the examination department also had enough time to complete pre-examinations protocols. In annual mode of examinations, the number of papers in honours or general degree courses were less in number than CBCS pattern. In CBCS pattern, a student can get a diversity of options to choose their elective courses or skill courses to complete a specific programme which was not allowed in annual mode of examination based curriculum. In annual mode of examination, a 'Statement of Marks' or 'Mark sheet' was generated after publication of result where a student can view their marks obtained against full marks and calculation of percentages. In contrast to annual mode in the Grade Cards in CBCS pattern a student can only observe their specific letter grades/ grade points obtained in each course and Semester Grade Point Average (SGPA) or Cumulative Grade Point Average (CGPA) after publication of each End Semester Examinations or Final Semester Examinations respectively. In annual mode of examination grater weightage was given on external examination. The quality of question papers were low (Prajapati, 2016). The question papers were mainly based on the memory of a student as well as of descriptive type. It is generally regarded as stereotyped in nature and easily predictable by the examinee. As a result, assessment on higher order skills like reasoning and analysis, creativity, lateral thinking *etc.* were compromised. The CBCS pattern introduced continuous assessment practice in its curriculum and provide a scope to allot marks in every cohort of internal assessments, attendance in class, sessional papers, seminar/ projects/ viva/ field work/presentations/ assignments *etc.* throughout the semester. This approach is not only helpful for holistic development of a student but also increases the scope to obtain better score/ grades at the end semester examination or final semester examination. The implementation of learner centric CBCS pattern of education system was very difficult in the context of conducting examinations especially for affiliating universities. To conduct an examination (Annual or Semester) and publish a result, a series of basic confidential process has to be completed *viz.*, the meeting of board of studies for each programme, selection of paper setters (internal and external), issue of appointment letters to the respective paper setters via postal system, receiving of question papers and record maintenance, issue of appointment letters to moderators, meeting of board of moderators and preparation of final sets of question papers, generation of list of eligible candidates/examinee, enrollment for appearing in the examination, admit card generation, venue selection, examination schedule preparation, printing, packaging, transportation and handing over of sealed day wise question papers to custodians, selection of invigilators, intimation to local administration for maintaining law and order during examination, collection of day wise sealed answer scripts, evaluation of answer scripts, award list generation and marks posting, tabulation, validation, publication of result, printing of gazette and marksheets *etc.* within a specific time frame (Fig. 1). All steps required more time due to large manual interventions as well as financial support for successful completion. In CBCS pattern of examinations, these processes are repeated twice in a year despite the post publication process like review, self-inspections of answer scripts *etc.* There are many other difficulties in rural affiliating universities during transformation of manual or partly adopted e-governance in annual examination system to CBCS pattern. Few of these are highlighted below.

III. Constrains To Conduct End Semester Examinations Under Cbcs

1. Student data Management The management of students' records is a very important part for conducting any under graduate or post graduate examinations. During annual pattern of examinations, there was an ample scope to incorporate the data or edit students' data throughout the year. In CBCS pattern, examination is conducted in semesters. Therefore, a limited time is allotted to complete records for preparation of students' statistics. In annual system, most of the cases, manual management of students' records had been handled to prepare the statistics. For CBCS pattern, there is a scope to credit transfer or facility for mobility from one institution to

another as a mark of learner centric approach. If this provision is considered for proper implementation, then manual operation of data management is not possible for execution. Generally, the examination department of any university largely depends on the admission/ registration data at the commencement of each semester for preparing the eligible list of candidates before the pre-examination process is started (**Fig. 2**). It is not possible to prepare list of eligible candidates manually with consideration of all valid chances of backlog students. Thus a large quantity of information may be handled for conducting the end semester examinations properly either fully by manually or partially.

2. Selection of Elective Papers In contrast to annual mode of two tier or three tier under graduate curriculums, CBCS curriculum has an interesting provision to choose elective courses of their own choice. There are different types of elective courses like discipline specific electives, generic electives, skill courses, ability enhancement courses *etc.* A candidate may choose elective papers from a pool of courses (*i.e.*, subject bunching) specified for each discipline or other discipline. These diversity of offering elective papers is directly related with the students which is ultimately linked with examination system. If the whole examination process operates manually, then there lies a probability of multiple human interference that may lead to wrong or duplicate data input against each examinee. In some cases, the objectives of selection of variable elective courses like discipline specific elective courses, skill enhancement courses, ability enhancement courses and ability enhancement core courses are not clearly understood among the students. On the other side, same course title of various elective courses may lead to confusion among the students to select a proper course to study.



Figure 1: The General outline of an examination system

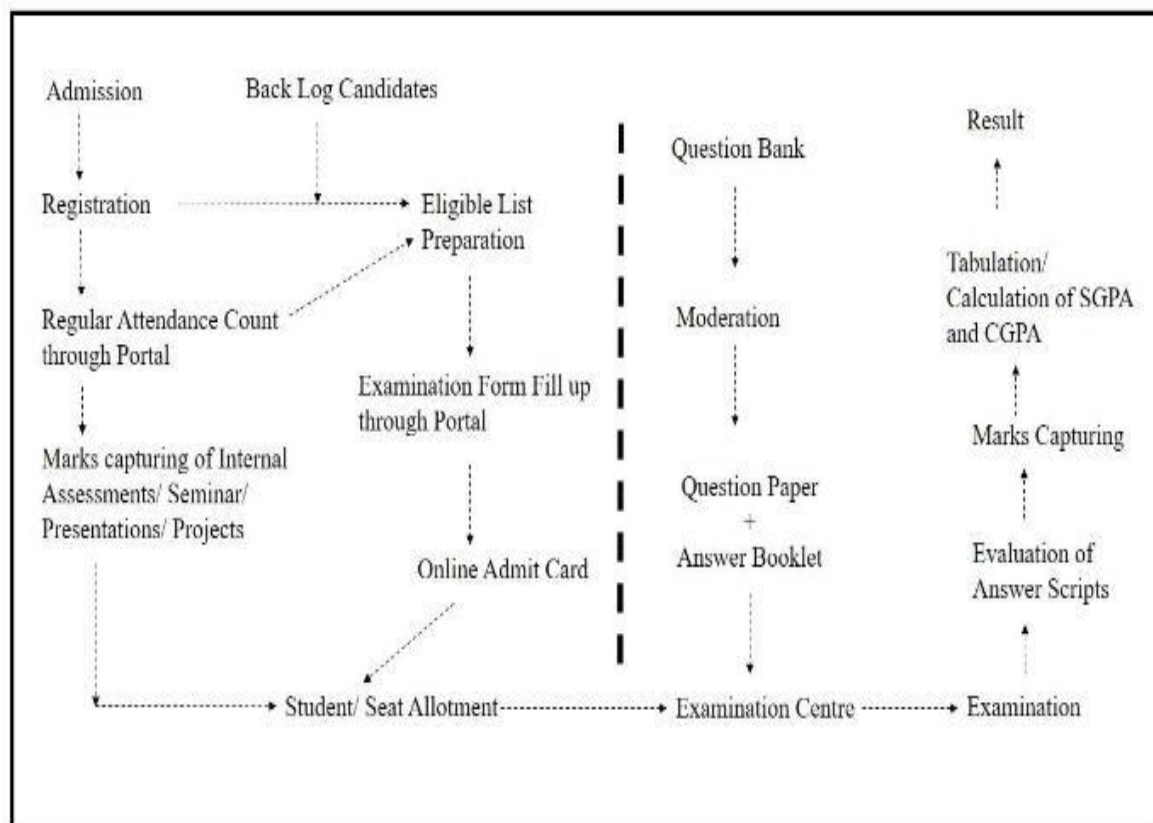
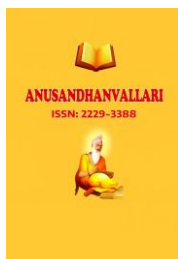


Figure 2: The figure shows dependency of data from selection of courses during registration to result publication

3. Preparation of Question Papers Preparation of question papers is a very important part of examination process. In general process, the examination department issues appointment letters to the respective course wise paper setters as per the recommendations of the Board of Studies for a particular programme. The physical copies of paper setting materials *i.e.*, appointment letter, instructions, syllabus, blank formats for writing questions *etc.* are sent to the specified address by postal system. It is not only a costly process but also time consuming. Other process of question preparation include moderation, handover of manuscript to the confidential printing press, proof checking, printing and packaging, transportation to venue *etc.* In CBCS pattern, a large number of questions has to be prepared in a short period of time due to its diversity of course options. Manual selection of courses according to programme structure is very vulnerable to finalize. Many universities have prepared a common question bank according to the instruction of examination department to minimize the time for question preparation. The Controller of Examinations has a critical role to monitor all the processes and activities. It is a very tedious task to complete all the process manually. During transition from annual system to CBCS pattern, every educational institution experienced the urge to develop a dedicated portal for question paper management starting from uploading of resolutions of Board of Studies to the finalization of question papers accurately.



4. Marks Management and Result Processing After completion of examination, the evaluation and marks management also play a crucial part in result processing. This includes collection of sealed packets of answer scripts (course code wise) from each examination center. The answer scripts are allotted to specific examiners for evaluation as per the decision of board of studies. During transition from annual examination system to CBCS pattern, manual entry of marks in each printed award list was very time consuming. So majority of universities has adopted digital evaluation process through the integration of information technology. The University of Cambridge first adopted digital evaluation process for local examinations in the year 1999. In CBCS pattern, there is a large number of cohort in each course to fill marks like theory, practical, internal assessments, class attendance, project/ viva/ sessional papers/ presentation *etc.* Any mistake or absence of marks may result in incomplete status. Manual interventions may also increase the probability of incorporation of errors in results. After accumulation of marks, tabulation sheets are generated for computation of result. In CBCS pattern, the calculation of result is reflected as grading (usually letter grades) on the basis of percentage of marks obtained by the candidate in each course. Depending upon the credit earned, the respective SGPA (at end semester examinations) and CGPA (at final semester examinations) is calculated. Another provision of awarding grace marks on the basis of specific criteria formulated by the university is still a significant part of examination system. Without intervention of ICT support, manual awarding of grace marks are not reliable for any examination system. The automatic generation of result statistics, gazette, tabulation sheets, mark sheets, provisional certificates *etc.* are mostly considered as authentic because it is prepared by specific program based portal system.

5. Preservation of Marks/ Grade Records The tabulation sheet with student specific obtained marks, grades and SGPA or CGPA for end semester examination and final semester examination should be preserved in the examination department. For preservation of semester wise printed tabulation sheets for any affiliating university needs adequate space and extra manpower for any enquiry purpose related to verification of academic record, marks statements or certificate of any student, generation of transcripts, preparation of annual reports, analysis of programme wise result statistics, convocation *etc.* Preservation of old records are also very costly due to its maintenance. Therefore, the tabulated data should be preserved digitally in secured platform for easy access to authorized persons like Controller of Examinations or nominated person as the records are fully confidential.

IV. Integration Of Information And Communications Technology (Ict) Examination System

The ICT is an important tool to provide a complete secured solution to overcome constrains faced by the examination department. It is a modernized system to complete the total examination process from enrollment to final certificate generation (Fig. 3). The integration of ICT support may accelerate the whole process of examination. Generally it provides various configured portals for all stakeholders like Students, Principal/Head of the Institutions, Paper setters, Moderators, Examiners, Head Examiners, Scrutineers, Controller of Examinations (Admin.), Vice Chancellor (Super Admin.) *etc.* The advantages of the integration of ICT support are categorized as – less logistic support of examination department, cost effective, less time consuming, online marks submission, automatic calculation of result, preservation of data *etc.* Apart from the conduct of end semester examination, the marks for continuous assessments or internal assessments, marks for the attendance, viva, seminar/ presentations/ sessional papers *etc.* may be uploaded by the respective examiners to the examination portal. A number of research articles have been published by various authors for successful ICT integration in the examination system [Akbar and Qureshi, 2015; Kavede *et al.*, 2019; Shinkar and Lal, 2019;

Wadate, 2014]. The whole examination process is not only related with academic part but is also intermingled with admission sector, registration department, finance department and general administration.

ICT may provide a single window to correlate with academic part of curriculum as well as other related administrative departments without moving physical documents from one sector to another. According to Bhardwaj and Singh (2011) there are huge scope of possibilities for integrating ICT with examination system and suggested that Automated Integrated Examination System will ensure efficiency along with effectiveness in the examination system. It also minimizes the human interferences during evaluation of the answer scripts and the information regarding result should be made available to the candidates through email addresses mentioned at the time of enrolment. Grade cards/ Mark sheets should be also made available online, so that candidates can access any time without facing any difficulty. In some cases, if any discrepancy is found in the results *i.e.*, not declared, incomplete, withheld *etc.* the candidate may apply multiple times through submission of hardcopies of papers and visit the university. Sometimes due to increased paper load in the examination branches their correspondences/ applications are not traceable due to which students face lot of problems. The integration of ICT in examination is the only solution to manage the whole scenario including routine daily examination related activities within a single window.

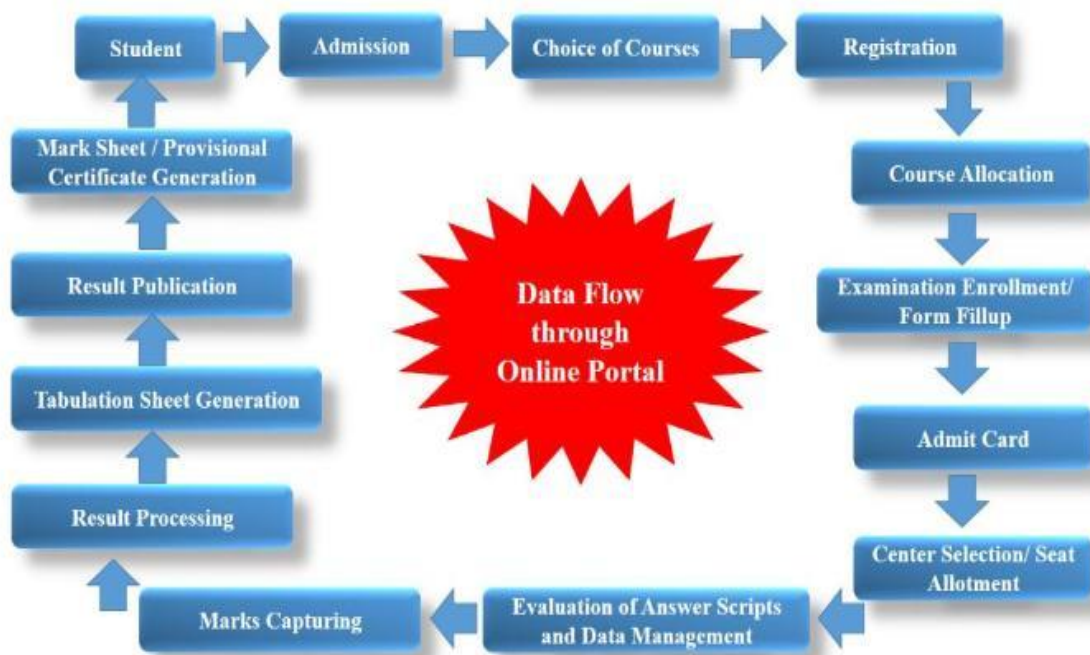


Figure 3: Flow of data from admission to result publication

V. Conclusion

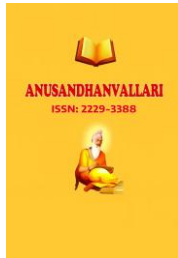
In the present era ICT plays a pivotal role in modernization of higher education system. Since the last decade, the higher education has experienced a tremendous growth in number of students' enrollment, courses offered,



number of affiliated colleges *etc.* which has ultimately over burdened the university examination system. ICT based examination management system is the only solution to deal with the whole examination process through a single window. However, it cannot be denied that this transformation from manual to ICT based management system is quite costly. Implementation of ICT based examination system in rural sector is more challenging. Students belonging to rural sector are mostly deprived of the new technology, they have to visit cyber cafes for filling the examination application forms. In that case, the entry of wrong information including selection of wrong elective papers may create problem in result processing. Notwithstanding the various constrains, ICT has lots of possibilities in improving the whole examination system according to National Education Policy 2020 (NEP-2020) by transforming the manual process and provide better accessibility to all stake holders and speedy processing of results. More studies are required to shift traditional education system to Outcome Based Education (OBE) system by adopting of Bloom's Taxonomy in question pattern, calculation of students' attainments through direct/ indirect methods *etc.* by implementation of ICT. The use of ICT will reduce the human intervention and bring automation and speed in a University Examination system with remarkable advantages such as elimination of paper setting work, thereby saving on human efforts, time and TA/DA of examiners, expenses on stationary and envelopes and other documentation required by external printer, removing paper leakages *etc.* ICT enables distribution of the question paper on the day of examination, reducing a huge amount of operating expenditure and logistics issues and leads to faster processing of the examination system and result declaration. Also, there is a need of well-planned tight scheduling of all events that should take place after the answer book is written by the student. We need to minimize the idle time at center, time of transportation and idle time at the CAP center before the answer book is getting ready for going into examiners hand for evaluation. With the use of strategic planning and implementing ICT this time can be reduced so as to declare the results in stipulated time frame. Entire ICT based process management will be governed by University Exam Department without any delay or mistakes, making a more transparent system, reducing all malpractices with the help of technology, resulting in a better quality functioning of the Institution. For implementation of ICT based reforms the University need to have up-graded in existing IT infrastructure, modifications in the current system. Exam centers also need to establish ICT supporting infrastructure and trained staff to operate these systems.

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