ANALYTICAL STUDY OF APPLICATION OF INFORMATION COMMUNICATION TECHNOLOGY (ICT) IN THE MANAGEMENT OF EXAMINATION SYSTEM

A thesis submitted to

Tilak Maharashtra Vidyapeeth, Pune

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In

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Submitted by

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(Registration No. 15815008550)

Under the Guidance of

Prof. Dr. Deepak J. Tilak

February 2021

CERTIFICATE OF THE SUPERVISOR

It is certified that the thesis entitled **"Analytical Study of Application of Information Communication Technology (ICT) in the Management of Examination System"** which being submitted herewith for the award of the **Degree of Doctor of Philosophy (Ph.D.)** in the subject of Management from **Tilak Maharashtra Vidyapeeth, Pune** is the result of original research work completed by **Nitin Subhash Kavede** under my supervision and guidance.

To the best of my knowledge and belief the work incorporated in this thesis has not formed the thesis for the award of any Degree or similar title of this or any other University or examining body upon him.

Place: Pune **Prof. Dr. Deepak J. Tilak**

Date: February 2021 **Research Guide**

UNDERTAKING

I hereby declare that the thesis entitled **"Analytical Study of Application of Information Communication Technology (ICT) in the Management of Examination System"** completed and written by me has not previously been formed as the thesis for the award of any Degree or other similar title upon me of this or any other University or examining body.

Place: Pune **Nitin Subhash Kavede**

Date: February 2021 **Research Student**

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Place: Pune **Nitin Subhash Kavede**

Date: **February 2021** Research Student

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LIST OF ABBREVIATIONS

AICTE	All India Council for Technical Education
CCTV	Closed-Circuit Television
CMS	Campus Management System
DDE	Directorate of Distance Education
EDC	Education in Developing Countries
EMS	Examination Management System
ICT	Information Communication Technology
IT	Information Technology
MCI	Medical Council of India
MS-CIT	Maharashtra State Certificate in Information Technology
MUHS	Maharashtra University of Health Sciences
NAD	National Academic Depository
NET	National Education Trust
ToT	Training of Trainers
UGC	University Grant Commission
IVS	Internal Vigilance Squad
CAP	Central Assessment Programme
NGO	Non-Government Organizations
OMR	Optical Mark Recognition

CHAPTER-1: INTRODUCTION

Introduction

India is considered to provide the world with quality education in ancient times. The University of Nalanda was founded by one of the emperors of Gupta in the 5th century AD. The Chinese traveler Hieun Tsang was researching and writing about the university's current education system. In ancient times the educational system started with Gurukul learning and has changed a great deal with its urbanization and culture has followed its own norms. The country implemented rules, legislation, guidelines and a regulatory system during the British era. In the Constitutional Reforms of 1919, the British Government declared schooling a subject transferred. Education, including university education, became the responsibility of the States from then on. The UK Government has moved education to the State Government from a political perspective, in particular in order to raise public money for education. There were only 20 universities at the time of Independence in 1947. There are now more than 300 universities and 45,000 colleges of different types throughout the country. In addition, the number of university registrations rose from one lakh in 1950 to more than 112 lakhs in 2007. Most of these educational bodies/regulatory agencies are recognised by the Government of India, the State Governments, or by the Societies. While lakhs of students receive education every year, the management of the examination system remains manual in most universities.

The Information Communication Technology (ICT) has become a popular, relevant and vital university tool. ICT use has become very common, but it still has its full potential to be explored. It is a useful tool in every company to establish good governance. Developing countries have now realized and started adjusting to the value of ICT as a fundamental tool for good governance. The government powered by ICT is also called "e-governance." University test systems are operated manually in India as a whole. The manual evaluation system faces accuracy issues and leads to delays in timely recording of the tests. ICT in the form of a campus management system (CMS) is an effective tool to incorporate and automate examination system activities to provide university secure, efficient, transparent and comprehensive e-government solutions.

Role of Examination in Education System

Examination plays a very important role in our education system. The entire building of the formal education system is based on the teaching, study and evaluation tripod. However, the goals and priorities of all three are different.

The first two may be an end in themselves, but the last is a means1. The exam makes the student work hard; it provides our education system with a direction, a drive, a target and an intent. Review is always an effective tool for assessing the quality and quantity of information or saying knowledge in a particular field. It is therefore such an important part of the education system that it can not be dispensed with. University assessments have a stimulating effect on students and teachers alike. The test gives a student a goal that allows him to achieve this goal in the prescribed time span. In other words, the test can be used as a whip to make the pupil do his job. The test is done to verify how carefully he did it. The test also offers the teachers a stimulus and an introduction to his work. Test findings can be used to direct the student in a particular field and therefore can be helpful in practice.

The test is basically a non-substitutive device. The student's success can be measured by reporting the results. The whole career of a student is focused on the timely results processing and represents how quickly and accurately the student reports the result. Examinations is called the' central education nervous system. This is because assessment has a deciding impact on employment. Thus, students and their parents have a lot of emotional stress. The deficiencies of our exam system have become proverbial. The examination is generally held to be a tool for measuring the quality and quantity of learning in a specific field.

Information and Communication Technology (ICT) in Examination System

The ICT has become a powerful, decisive and vital tool for individuals, businesses, companies and organizations. ICT has reached every entrance, but it needs to be fully exploited. There are many problems facing the university examination system to report timely and accurate results. ICT's are a very useful tool to provide the world with E-Governance, which changes the working culture of organizations and institutions. Students spend precious time and money on

accurate information but do not get the information they want. Students will waste time and money to get this information by visiting universities physically, and sometimes even bribe for it for many reasons. One of the main reasons for this is manual administration of the Indian University Examination System.

Many universities already use ICTs for more effective and competitive processes, both in the delivery of lectures and in administrative processes. The implementation of ICT changes the way universities work. For more precise information and quicker facilities, consumers (students, parents, teachers, and colleges). For example, students would like to check the balance of payments, register and print their result off-campus on-line. According to University Quality Assurance, demand to automate the university cycle is becoming crucial.

The policymakers are emphasized to the greatest extent that ICT (Information and Communication Technology) is an important medium for process changes and an effective tool for transferring the entire governance. It is understood that computers are a very advanced communication tool. It can deal with both true and logical problems and can add to the matter of communication the same arithmetic and logic. Communication is becoming more successful in such an event. ICT is rising around the world and has reached common people by overcoming all geographical barriers. Access to information at its doorstep at a minimum cost is therefore important for the people. The interactive design and ability of ICT will allow the citizen to save money and time. In India, internet transactions have been legally legitimate since the passage of the Information Technology Act in 2000.

Examination System in Universities of India

Testing in the university education program plays an important part in assessing student cognitive ability and retention. University exams not only inspire students but also teachers. It motivates the student to make every effort to achieve his goals. This motivates students to research and read various books and to incorporate their ideas into a problem-based learning method to respond to the problem. We may conclude that exams are unavoidable when students and teachers are working without them, neither precision nor direction. Examination method is an effective tool for the evaluation of information quality and quantity.

University exams are administered in various phases before the conclusion of the academic session. Examinations are regularly and regularly conducted during the entire session. Tests lead to physical and psychological stress for students. For manual processes, the time from test to declaration of results is quite long. This leaves students idle for a long time. However, test dates and results are different between universities, so that students often miss the opportunity to gain admission into higher studies or academic fields of their choosing.

Conduct and Phases of Examination System

Testing is a technological process involving the different types of data that are handled in the university testing department. The review process will be performed in three different phases:

a. Pre-ConductPhase:

Students ' application forms are processed, fee fees administered, attendance is established and all students ' information, such as college code, registration number, course code, etc. is given. The student istold of any inconsistencies in these forms for correction. Test centers are allocated for the test.

Test at various theory centers affiliated with Maharashtra Health Science University, Nashik of the state of Maharashtra. The respective Theory Center must comply with the University's guidelines and directives for the conduct of clear and smooth exam examinations:

(a) A Strong Room with a single door opening shall be provided. Door must have protection door and a barbecue facilities must be installed. It requires a CCTV camera with recording device.

(b) High-speed Internet computer (Latest version) in Strong Space.

(c)01 Laser printing machine (per 100 students), d) Photocopying machine (approximately 35 p.m.) e) 24 X 7 Uninterrupted electricity / generator f) land-line telephone line g) 07 classrooms with 30 sleeves with CCTV-camp with recording facility (Big size for two sleeves).

Center In-Charge, Center Observer, Internal Surveillance Squad, Flying

Squad, Sr. Supervisory personnel. Supervisors and surveillers will be detailed at the University Test Theory Centre. Such supervisory staff are selected fromcolleges and assigned to examination centres. Their briefing sessions are carried out via university-level seminars and workshops. Summaries of the different courses, faculties and subject code are told. It is twice in a year at least three or four months before the university exam.

b. ExecutionPhase:

Conduct of Exam is a critical phase. Release of papers in confidentiality, deployment of invigilator, issuance of serial numbered answer sheets, arrangements of candidates according to the seating plan, verification of candidates, distribution of Question paper & Answer-books to the candidates & collecting back the written Answer-sheets, storage and collection of Answer-sheet bundles, disposal of cheating (Unfair-means) cases are the major components of this phase.

c. Post-ExecutionPhase:

This process involves coding and decoding the answer books, the decision of the central evaluation centers for sending labeling answer sheets, the assessment of answer books, the compilation of evaluated response books, the scanning of trademark streams, the tabulation of trademarks receivable, declaration of results and final transcripts to the students etc. Processing students' mark restoration requests, Xerox copies of a resolved response book and the same procedures can be done over and over as the student can still submit duplicates, etc.

The student evaluation information is stored for a specific period and some details, such as results reporting and graduation records etc., need to be permanently retained in order to ensure future documentation or resolution of conflicts, if any. The investigating section, registration section, conduct section, secrecy section are all in agreement and all the sections are therefore situated in the immediate vicinity. Such sections are staffed by different officials, who clearly define their job description and are liable for any breach or misrepresentation of exam activities.

Limitations of Manual Examination System

The manual exam system is structured in a well specified physical portion, but the process is still extremely slow, given the nature of the technical data to be processed. The evaluation process in a manual system takes longer time to make the examiners and employees of the university physical and mental pressure. The recording of results takes a long time because students stay idle together for months. The delay in announcing results also leads to a loss to students because they may be denied the opportunity to appear at competitive examinations for further studies or to enter positions due to the absence of examination leading to time.

Students may have to contact the university via e-mail or for minor test queries. Often their mails may be delayed because of increased paperwork in the review divisions. Personal visits to universities waste valuable time, energy and abuse of students. For many factors, students are also seen jostling around the university in different service windows.

a. The manual inspection method is vulnerable to numerical errors, time usage, inadequate and degenerative capital.
b. Research is replicated as the same data is processed in different sections of the examination. It takes time for students to retrieve records via manual logs, to maintain records, to reconcile data etc.
c. There is still a risk of altering student records in the manual review system. Online verification of the same is not available. This leads to unfair practices and also damages the University's reputation.

Students Support and Outcomes on Examination:

Education has always been positioned as a mechanism for fostering both national and international development. Education is a key factor in the development of the country.

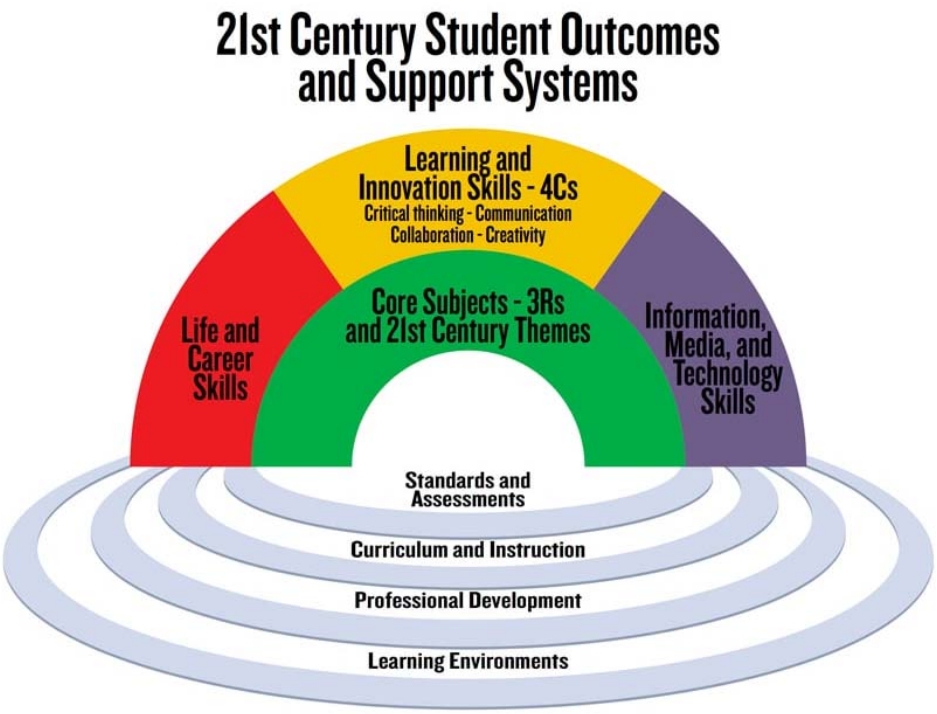

Figure 1.1-21st Century Student Outcomes and Support System

Evaluation plays an important role in teaching and learning throughout the education system. Examination is a tool for testing what students learned and recalled in their minds during their studies. Testing is an integral part of our system of education. With the technological revolution, the digital media or ICT substitute for electronic media and nearly every aspect of human activities relies, to some degree or other, on new computer technologies. It is true that ICT has a huge potential for information dissemination, improvement in learning and the creation of more efficient education services. ICT has opened up new avenues of education through expanded accessibility of information and enhanced processes of interaction. All universities experience a transition from a manual to computer technologies / ICT in the case of the examination system. The enhancement of the examination system will eradicate human intervention through the use of ICT, since the technology promises compact storage, quick data retrieval and unstoppable work. Global education reforms and growing ICT demands have led to a dramatic change in the role of ICT production and ICT use in education. The entire test system can be modified by ICT.

The standard of education we offer our young people as a priority at which we rate it leads primarily to shaping public attitudes. The great effect of education on the national nature is understandable once we realize that power education is both short-term and long-term for all concerned. The formal education program has a proper

curriculum and a clear evaluation process. Evaluation allows us to realize whether we are headed or not. It is critical not only for the peoples who run the education system, but also for the students who experience this process. Examinations are one of the techniques used to test the student.

Digital Transformation Initiative in Higher Education by Govt. of India

1. SWAYAM

Under the Government of India's' Digital India initiative,' one of the main areas is' Massive Online Open Courses (MOOCs).' MHRD, the Government of India, is undertaken to provide an integrated online platform and database on the' Research Channels of Active Learning for Young Talented Minds' (SWAYAM).

2. Swayam Prabha

The SWAYAM PRABHA is a network of 32 DTH channels dedicated to broadcasting high-quality training programs 24X7 via satellite GSAT-15. New content will be presented every day for at least (4) hours, repeated five times a day, which liberalize the students time of viewing the program. The channels are linked from Gandhinagar, BISAG. NPTEL, IITs, UGC, CEC, IGNOU, NCERT and NIOS provide the material. The INFLIBNET Centre's website is maintained.

3. National Academic Depository (NAD)

The dream of the National Academic Depository (NAD) comes from an effort to provide an online store with all academic awards. National Academic Depository (NAD) is an online 24X7 shop for all university awards. Duely digitized and deposited by Academic institutions / Commissions / Qualifications Testing Bodies certificates, diplomas, degrees, mark sheets, etc. NAD not only provides easy access to an academic prize, but also validates and protects its validity and storage. Two interoperable digital depositorys are included in the National Academic Depository. NSDL Database Management Limited (NDML) and CDSL Ventures Limited (CVL). These digital warehouses have ensured prescribed quality hardware, network facilities and software for smooth and safe NAD service..

4. India’s National Digital Library

It's a holistic-digital library that stores information (metadata) on various types of digital content, including books, documents, images, audios, thesis and other user-related educational materials of different levels. It provides a single window search facility for accessing current digital content in India as well as other digital outlets under one single paragraph.

5. E-Shodh Sindhu

The MHRD has developed e-Shodh Sindhu, integrating three consortium projects, UGC-INFONET, NLIST, and INDEST-AICTE Consortium, to provide country-wide access to journals checked by peers and a variety of bibliographical, quotation, and factual databases.

6. Virtual Labs

The Virtual Labs initiative is a National Project for Education through Information and Communication Technology (NME-ICT) initiative by MHRD. This initiative, which co-ordinates IIT Delhi, is a consortium of 12 participating institutes. Such a remote research project was first undertaken. The Virtual Labs Project produces over 100 Virtual Labs, consisting of about 700 + web-enabled projects, for remote operation and viewing.

7. e-Yantra

E-Yantra project is one of IIT Bombay's initiative to educate on electronics embedded systems which is financed by MHRD under the National ICT Education Program. This project was incepted due to Prof. Kavi and Prof. Krithi from IIT-Bombay.

8. Talk To a Teacher Programe

A-VIEW is a tool part of an IIT-Coordinated Teacher System sponsored by the Department of Human Resource Development (MHRD) under the National Education and Communication Project (NME-ICT) of the Indian Government. Within Virtual Labs, Haptics and Natural Language Processing several other tasks are carried out. The A-VIEW Tool is now used by many IITs, NITs and other leading educational establishments throughout the country.

9. Integrated e-Content Portal

A portal for the hosting of all e-content projects established under the ICT National Education Mission scheme. It also involves NME-funded projects. There are about 70 e-content projects under this scheme that are being developed and established through different Indian institutes and universities in various education areas, such as science, the arts, engineering, social sciences etc. The portal will allow the learner to easily access the required material, including audio / video study material, textual material, enhanced multimedia material, etc. through a single interface, by searching or browsing any house content. In addition, it will also have provisions for "my account," "my room" etc. in order to make the portal customized and user centric. It allows the user to handle the site properly, monitor its use, statistics, etc.

10. E-Kalpa

This project on ' Creating a Digital Learning Environment for Design ' also known as ' e-kalpa ' is funded by the Ministry of Human Resources, Government of India as part of the National IT Education Programme.

11. The Open Source Software in Education

Free and Open Source Education Software project encourages the use of FLOSS resources that improve the quality of our country's education. It aims to reduce reliance on proprietary software in schools. This promotes the use of FLOSS resources through different programs to ensure that proprietary software is replaced with similar FLOSS tools.

12. VIDWAN

VIDWAN is the leading profile site for scientists / researchers. It contains profiles of researchers and faculty members at various levels of the research and development organization and leading academics. The database contains information such as background knowledge, contact information, work experience, academic publications, qualifications and accomplishments, the name of the researcher, etc. The database has been developed and maintained with financial support from the National Education Mission via ICT (NME-ICT), by the Information and Library Network Center (INFLIBNET). The database helps select the members of the committee set up by the ministries/governments. Monitoring and monitoring institutions.

13. The Spoken Tutorial Project

Spoken Tutorial project is an initiative of the' Speak to a Teacher ' program initiated by the MHRD, Government of India, of a national mission for education through information and communication technology (NME-ICT).

One of the award-winning educational content portals "Spoken Tutorial," where everyone can learn different Open Source applications at no cost. The courses are autonomous and in many languages and anyone who wants to know can easily learn. Under the CC BY SA license all content published on this website will be shared.

The Spoken Tutorial Project for MHRD, Government of India, will be established by IIT Bombay.

14. Baadal:

Baadal is a cloud management software developed and maintained by IIT Delhi and implemented by MHRD under the NMEICT program. It ensures optimum network usage and speeds up e-Govt development and deployment. Academic requires implementations.

It is housed in the data center of NIC.

Complex resource planning and power management are some of the main features of Baadal.

- An automated management framework for virtual machine request and commissioning.
- Suspending, resuming, shutting, power off, power on and resource requirement defining of virtual machines.
- Control of complex resource usage.

Under this scheme, government and semi-government institutes are supported in adapting their infrastructure needs without solving management problems.

Since Baadal is an open source project, institutes can set up their private cloud.

15. Global Initiative of Academic Networks (GIAN)

Govt. of India has launched Global Initiative of Academic Networks (GIAN) in Higher Education aimed at taking advantage of the talent pool of scientists and contractors, promoting international collaboration with the higher education institutions of India in order to improve the country's established academic resources, speed up quality change and increase India's science and entrepreneurial skills and capital.

16. National Institutional Ranking Framework (NIRF)

The MHRD approved the National Institutional Ranking System (NIRF) in which a criteria for classifying institutions across the country is outlined. The methodology stems from the overall recommendations made by a core committee formed by MHRD, in which the criteria for ranking universities and institutions are defined. The criteria include the following: "teaching, learning and resources," "research and best practices," "graduating results," "extension and inclusion" and "perception".

17. IMPRINT

IMPRINT is a joint MHRD Pan-IIT + IISc project aimed at addressing major scientific and engineering issues in India. This kind of initiative supports and encourages inclusive growth and self-confidence, empowers and enhances the country. The goal of this new initiative with two objectives is: (a) to develop a new engineering education strategy (b) to create a roadmap for problems in engineering

18. SAKSHAT- One Stop Education Portal

His Excellency's then President of India unveiled on October 30 a One Stop Education Platform to encourage lifelong learning for students, teachers and those in work or in the pursuit of knowledge free of charge. The Content Advisory Committee (CAC) on the subject was tasked with the task of developing content for' SAKSHAT,' comprising members from educational institutions such as IGNOU, Delhi University, Kendriya Vidyalaya-Sangthan (KVS), Navodyaya Vidyalaya-Sangthan (NVS), the National Open School Institute (NIOS) and the National Education Research & Training Council (NCRT). In addition, some NGOs supported the content they created for this portal free of charge.

The goal is to expand this pilot project' SAKSHAT' with a proposed scheme of the National Education through Information and Communication Technology (ICTs) in order to meet the learning needs of more than 50 crore people. The program is designed to offer all higher education institutions access to the world of information in cyberspace, to build on ICT capacity, to provide quality knowledge modules with the right e-contents, to fullfil the leaners expectation. The scheme may also include the certification of human resources competencies obtained by formal or non-formal means and the development and maintenance of the human resource profile database.

19. Atal Ranking of Institutions on Innovation Achievements (ARIIA)

Atal Rankings of Innovation Institutions (ARIIA) is a Ministry of Human Resource Development (MHRD) project in Govt. All India's major educational institutions and universities systematically rank among students and faculties on indicators of "innovation and entrepreneurship development.

20. DigiLocker

DigiLocker is a digital platform for records & certificates to be released and checked, removing physical documents. Indian people who sign up for a DigiLocker account receive a dedicated cloud storage space linked with their adhaar number (UIDAI). Registered Digital Locker organisations will directly transfer electronic copies of documents and certificates into citizens ' lockers (e.g. driving licence, voter ID, school certificates). Scanned versions of their existing records can also be submitted to their accounts. These legacy documents can be signed via the eSign facility electronically.

The DigiLocker system's key technical components are:

- Repository: Set of e-documents which are displayed through standard APIs for safe, real-time access.
- Access Gate way: Safe online system for applicants to use URI (Uniform Resource Indicator) to access e-documents from different repositories in real-time.
- DigiLocker Portal: cloud-based personal storage area linked to every Aadhaar resident for the storage of e-documents or e-document URIs.

21. National Programme on Technology Enhanced Learning (NPTEL)

Seven Indian Institutes of Technology (Bombay, Delhi, Kanpur, Kharagpur, Madras, Guwahati and Roorkee) together with the Indian Institute of Science, Bangalore, launched the National Program on Technology Enhanced Learning (NPTEL) in 2003. In this phase, five core disciplines were identified namely civil, computer science, electrical, electronics and communication and mechanical engineering, and 235 web / video courses were created.

The main focus of the NPTEL Phase II between the years of 2009-14 was to build and improve on the engineering and core science courses launched previously in NPTEL Phase I. Later more than 600 web courses and videos were created in all major branches of engineering, physical sciences and management. These courses were at the undergraduate and postgraduate levels. Many enhancements have been made, such as indexing all video and online classes, and keyword search.

22. OSCAR (Open Source Courseware Animations Repository)

The OSCAR project (Open Source Courseware Animations Repository) provides a web-based repository of interactive animations and simulations referred to as learning objects (LOs). These learning objects span topics at university level in science and engineering, and at school level in math and science. These learning objects can be viewed, run and downloaded by students and teachers.

23. ShodhGangotri

For registering to a Ph.D. programme it is mandatory for the research scholars to submit softcopies (electronic version) of their approved thesis to the university in which they have to get admitted. This will help in understanding the trends in researches carried out in different Indian universities and will also help in avoinding duplication in research. The Synopsis submitted in "ShodhGangotri" would later be mapped to full-text theses in **"ShodhGanga"**. Once a full-text thesis is ready for submission for synopsis, then a link to the full-text theses will be provided from ShodhGangotri to **"ShodhGanga".**

24. Virtual Learning Enviornment

VLE, an e-resource online platform, serves a variety of disciplines taught at

the graduate and postgraduate levels. It's a project of the College of Life-Long Study, University of Delhi. Crafted in 2012, VLE now has cutting-edge materials that relate to a wide range of new students, not only from the University of Delhi, but also from other universities. Interactive multimedia material charged by VLE is graded as disciplinary based on several successful models of Moodle.

The lessons are produced and continuously edited by highly trained faculty members throughout universities, primarily by discipline expert boys who edit, supervise and organize the content. In order to guarantee consistency and standardisation, the contents go through several stages of thorough peer review and academic assessment. VLE also has an audio, video and short film multimedia archive for introducing pupils to new technology in pedagogy.

25. Text Transcription of Video Content

The text of the video lectures is generated through manual processes and is therefore vulnerable to errors. The text content given on this site has no claim to be correct. We work with many professors to correct their transcripts so that they can become both actual transcripts and readable texting help for people with limited bandwidth and unable to access full video courses. An audio file (mp3 format) and the transcript of each file are given as a download. The.pdf transcribed files are also used to provide video subtitles and can be used to translate local languages in future.

The text is used to establish metadata and the search index and the video time coding is used to provide file markers for easy scan. The project to transcribe all NPTEL released videos (currently over 11,500 hours and expected to flood to about 20,000 hours a year) is an ongoing project, which can not be prevented without delays.

26. SOS Tools

Software and simulation packages acts as aid for the students of Science, Social Science, Engineering, Management and other disciplines in solving their problems and analyzing system. Out of the many available software packages, mostly they are either costly or require yearly license fee for maintenance and updating. Besides this, many open source softwares are available which are similar to these paid softwares but are not user friendly and without proper documentation. Also,

adequate manpower to teach students how to use these open source software packages is also not available.

The objective of project is to develop software tools for system and computation analysis, to build enough manpower to teach students to use this open source software. The software developed should be intuitive and easy and documented adequately. These packages, customized to our students ' needs, will be ported on Sakshat to be made available freely to any user, teacher or organization willing to use them.

27. e-PG Pathshala

e-PG Pathshala is an initiative of the MHRD undertaken by the UGC under its National Mission on ICT Education (NME-ICT). Material and quality as the key component of the educational system were developed by topical experts working in India, the high quality, curriculum-based interactive e-content and 70 subjects from all disciplines in the fields of social sciences, arts, social sciences, natural and mathematical sciences, linguistics and languages. -subject has a team of lead researchers, document coordinators, content writers, content managers, web editors and a multimedia team.

The Growing Importance of ICT:-

Figure 1.2 : The Growing Importance of ICT

ICT provides new ways of information and knowledge creation, search and

sharing. As the amount of information increases rapidly, management of complex organizations and the identification of appropriate and accurate information and knowledge is becoming even more critical.

ICT is now necessary to support the businesses of education institutions and support the entire academic life cycle from initial student inquiry to accreditation, graduation and more.

It consists of six major fields: payroll and financial accounting, student data management, inventory management, preservation of personnel records, library systems and learning management systems.

The main IT systems cover the areas below. First of all, the student moves from first inquiry to graduation. It involves conducting initial inquiries about classes, preparation, selection of the program, monitoring and support for a course, the management of assignments, examinations and graduations.

In recent years, many groundbreaking projects in the area of analysis and assessment have been undertaken. Online assessment is now very popular worldwide. Online tests allow assessment and evaluation processes important to learners, and can be carried out when the candidate is ready instead of at the discretion of the system.

Because the students learn at different rates, there is no justification other than administrative convenience to concurrently assess them in all the courses at a certain fixed interval. However, ICT use in education has now reduced this administrative challenge by making the examination system more versatile and more student-oriented. In general, each student should be given a choice of exam according to his or her preparation. In addition, a large number of students work or work at the level of higher education, particularly in the open and distance learning system. Many such distance students do not pass because they don't have enough time to get ready for all subjects more than a week before the exams. Allowing them to engage in the test to improve their efficiency according to their comfort and training. Allowing students to do more than two tests once a year will contribute to a more student-friendly program and raising the burden of students. In the long term, it becomes important that the system increasingly transitions towards the online and/or on-demand examining framework allowed by ICT.

On-Demand ICT Examination

Normally, the exams are based on institutes and therefore many students appear without adequate training, resulting in a lower percentage of results in many subjects. In addition the faculty usually makes preparations for semester-end exams that take too much of its precious time and energy, which they would otherwise have devoted to academic matters effectively. Considering the need for on-demand instruction, the assessment system also needs to be made more versatile and learner-friendly. The ICT can be used in the evaluation system.

In India the (NIOS) has introduced very effectively at school level and the IGNOU at higher educational level the on-demand test scheme, which is basically a combination of ICTs with the conventional exam system. Individualized question papers are produced on-site online just a few minutes before the exam. A robust ICT-enabled exam program gives students many advantages: ¯ It provides the learners the ability to take their exam as soon as they feel ready for an exam after the minimum eligibility requirements have been fulfilled.

BAT It also helps to reduce the risk of exam malpractices as each student will obtain a different set of questions.

It helps to reduce the fear of failure in the exam and thus to save distance students from anxiety and depression.

CATE may help to improve the pass percentage of university students by giving the opportunity to very motivated and prepared students to take the exam.

It can increase the reliability of exams and provide assessment as a continuous

process. It can also reduce the burden of the university's term exams.

Figure 1.3 : On-Demand ICT Examination

The OD Exam system established by the University of Tamil Nadu, which

deals with almost all aspects of the exam from online registration to paper production, online delivery and different types of information for students. It essentially has three modules–Online Registration, Query Document, Regional Center Module. Both three modules are completely ICT-based on-line and have multi-layered security, well-defined accessibility and scalability provisions. ICT allowed monitoring under web camera surveillance for on-demand review ensures that the OD-Exam is carried out equally and smoothly.

This creative and ICT-enabled exam method is quite versatile and independent of the conventional timetable since the students do not have to wait until the six-monthly test. It uses ICT to solve human limitations problems; it makes it possible to generate simultaneously parallel query documents instantly and encourages allowed entry in data at different points, leaving no risk of human mistake. It is indeed an ICT-based effort to update the evaluation framework without abrupt changes.

Some of the innovative features of the on-demand test are as follows: The on-demand review registration is entirely on-line. Hall Tickets indicating date & time are distributed on-line, following eligibility and receipt of the registration fee.

There is an automated mechanism in place to verify student credibility, exam eligibility, admission validity etc., ensuring that only genuine learners are entitled to gain. It has multi-mode registration fee payment service, which includes on-line payment by credit card, bank draft and cash challan etc.

There is an objective, accurate, true and realistic framework for the whole ICT scheme. It is free, stable and fully clear. It is not only user friendly and easy, but also inexpensive and saves time and effort when setting questions, managing databases, and transferring information.

The customized question paper may be produced in encrypted form on the day of examination, and the questions may be taken randomly from the question bank as per blue print and design.

The approved individual can decrypt the question via a special decryption software and a single key generated along with a different question paper for different examination centres. In addition, decrypted query papers cannot be saved on a system

hard disk.

Each question paper has a specific bar code and a single question paper code with the date and time of generation to match the student's question paper and response sheet at any future moment, if requested;the entire test is centralized in its regulation, beginning with the registration to the declaration of performance.

It has an integrated backup of the database, such as created and printed question papers, database changes, etc. Log files are created which specify the device from which the server is accessed by date, time and IP address.

In this relation, it should be specified that the program has made provision to automatically receive information on the date, time, name of the question paper and the address of the device from which the question paper is downloaded in the administrator server.

There is therefore a provision for tracking the way question papers are obtained.Today, when students want "instant testing-instant test results," online exam and assessment can be a viable solution. Higher education institutions, in particular institutes conducting entry exams, have begun to use ICT.

The IGNOU has also developed a prototype of an e-test online assessment method. The context operational strategy includes the implementation of a multi-purpose digital question banking, an online registration system, online question paper production, online evaluation and instant statement of results. A specially designed multi-purpose question bank with different questions should be established for different courses. The operational approach at the front end comprises online registration of e-tests, instant generation of individualized & exclusive question papers, online examination, and online instant assessment and results statement.

This groundbreaking online review and assessment scheme is not only cost efficient but also extremely learner-friendly. The spontaneous generation of electronic question papers, immediate online evaluations and immediate transition to the Assessment Division of student data and data saves time. Certain innovative features of this scheme are; a free Error online database of registered and appeared students, animmediate assessment of responses and instant analysis of results. The following are:

- Better quality of 100% objectivity question paper.
- Individual and unique question papers of equal complexity
- No risk of coercive behavior and use of unfair means during review and evaluation of answers.

No choice of leaking question paper because questions are created by random assortment at once and are posed one by one before the student. In addition to the above, most administrative involvements, including the preparation and printout of question papers, dispatch to exam centers of question papers, setting up test centres, dispatch of answer books to assessment centres. It will also contribute to increased administrative efficiency. The Term End Test pressure may also be reduced.

Roadmap for Future

The potential roadmap of ICT-based education depends on a quick penetration of broadband, the availability of digital educational format of online and mobile learning content and the maturity of consumers. In the former context, the government seems to move quickly enough to build the appropriate infrastructure as soon as possible, while the latter is only in the initial phase of the introduction of city consumers to the digital model of education and is now more prudent to choose the right content to complement offline teaching in the classroom. The big chance lies in rural areas, where the new format will offer huge gains. At the other hand, increased cooperation between learners in all segments will be a significant outcome of digital education. In the future too, self-paced and on-demand learning will gain momentum.

The UGC launched a scheme for quality and excellence in higher education, called the "ICT for teaching and learning." Network facilities were built at the UGC office with the support of the Ministry of Information and Technology, ERNET. In conjunction with this UGC, the UGC INFANET has begun a mega program by incorporating information and communication technology (ICT) into teaching, education and management processes, and is a network of Indian universities and colleges. The network is operated by ERNET India and nearly all universities are members of it. The UGC's autonomous Interuniversity Center Librarian Network (INFLIBNET) is a central agency for organizing and supporting the connection between ERNET and universities. Workplace training programs to manage ERNET

facilities and other aspects of systems, including electronic subscriptions, were developed. UGC also promotes the creation of e-content / learning material for teaching processes in schools and universities and the management of education.

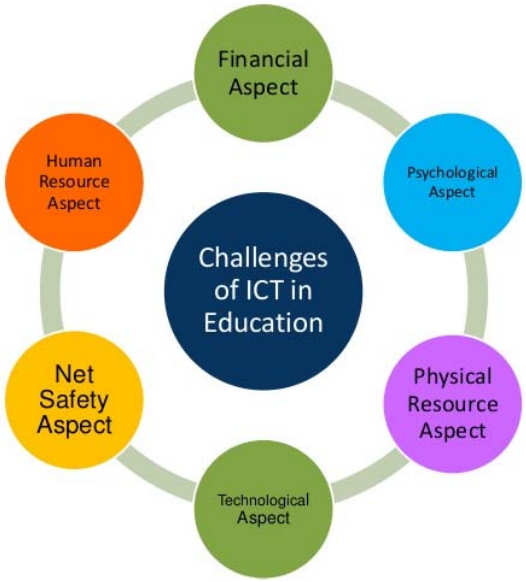

Figure 1.4 : Challenges of ICT in Education

Information Communication Technology (ICT) has been a significant driver of creativity and productivity for many industries around the world. In the field of education, ICT technology has become an integral part of the process of learning both outside and inside the classroom. Over the past two decades, the government and other educational stakeholders, such as university management and academics, have invested millions of dollars to introduce ICT in the education system. In the application of ICT, several universities which have completely implemented ICT have made enormous progress in developing learning methods, teaching, research and development.

In the university education system, all related actors involved in higher education have made tremendous effort to ensure ICT adoption.

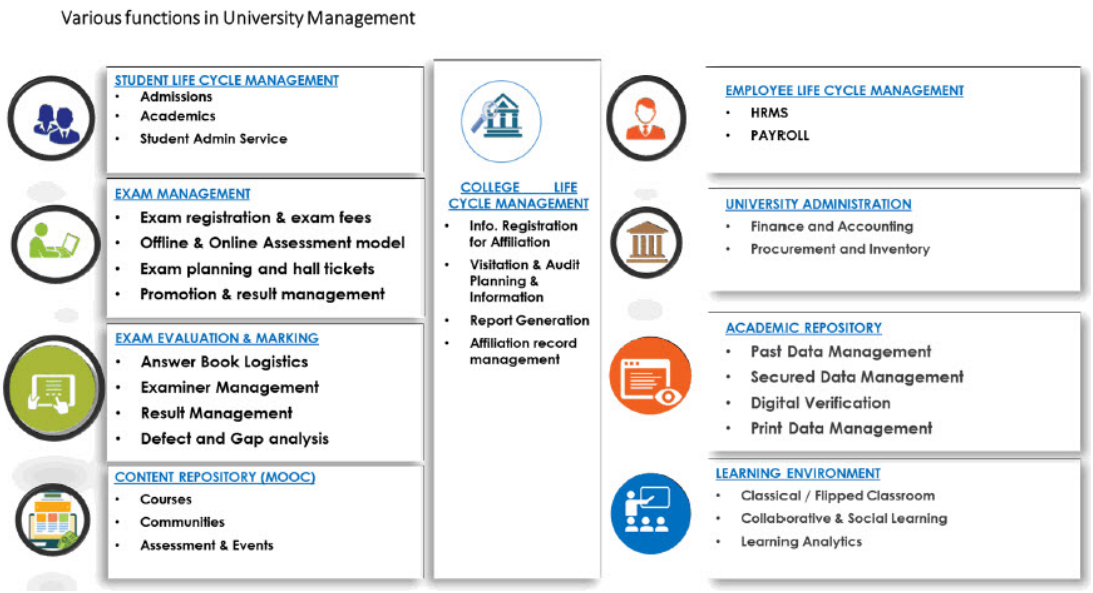

Figure 1.5 : Various Functions in University Management

According to a report published by UNESCO Institute of Statistics (2013), the governments and University Management have invested heavily globally in the implementation of information technology in their education systems. In the overall context, various theoretical and analytical efforts have been made to assess the impact of ICT adoption on the education system.

The recent research frameworks for the study of ICT adoption in higher education concentrated only on aspects relating to education performance. Other frameworks have used these performance indicators to determine how variables like infrastructure and the availability of other sources relate to the effect.

A few studies have also integrated the institutional culture as well as the method of initial and advanced implementation, both domestic and international, and have shown tremendous progress in developing policies and regulations to facilitate the introduction of ICT into the educational system.

The university administrators and faculty too are looking for the best approaches to applying ICT technologies and its effect on education, for instance the Second Information Technology in Educational Study (SITES) is a study sponsored by the International Association for the Assessment of Education Activities (IEA).

The new exam system needs to be standardized because the manual exam system was used when the registration numbers of students were smaller and the number of courses taught was less. In today's scenario, Nashik is the only university in the State of Maharashtra that provides education for various health related undergraduate and postgraduate courses such as fellowship courses, Diploma courses, Superspecialty courses. The growing burden of examination because of the increased number of students and of the number of courses and maximum faculties as well.

Some of the real advantages of automation and integration are as evident:

- ICT usage enables the convergence of all sections, but these sections will logically continue to function as before.
- The protocol for examination fee defaulters will be streamlined, cases of attendance deficiencies found and a specific class track as provided by the program will be retained. The candidates appearing in the review without duplicating records will be centralized, stable and reliable databases.
- The service quality should increase stakeholders ' profitability.
- The automation of the test system will result in successful evaluation process control and will eliminate fraud. The statistical analysis of data will contribute to patterns at different levels, and will help to determine strategically.

In addition to these benefits, culture pull is a significant impetus to a shift in an alternative approach to research. In academic practices, fraud and corruption are growing within society. The major causes of academic fraud include increased higher education, competition between students and institutions, globalization that leads to foreign student mobility, the use of outdated testing program methods, inadequate rules, and lack of responsibility and regulation.

Shortcomings in the Existing Examination System of MUHS

Examination and associated issues are the main focus of education at the University of Health today. There is hardly a month in the competitive world where there is no test in the region. The study lasts for months, triggering physical as well as mental stresses.

Furthermore, since dates of exams and results are different among the state universities. Students are usually not eligible to be enrolled in professional courses such as medical, super-specialty, other qualifications, diploma courses, etc., or to take

competitive exams at the national, international or state level.

Students or Colleges in various fields have to visit universities to apply for name correction, graduation certificates and a photocopy of the answer book, duplicate mark sheet etc. and often have to collect it in person to waste its precious time and money. Some of the drawbacks of the current MUHS exam program are:

- The manual review system including approval of exam form contributes to delays, enhanced time usage, inefficiency and waste of valuable capital.
- Due to lack of collaboration between different sections of university, lot of time was spent on repetitive tasks, which subsequently delays the results.
- The maintenance of the student record is very boring under the current system. It requires much time to look for the record of students in the manual registers, recordkeeping and reconciliation, etc.
- The manual examination system lacks secrecy and tampering issues. No system in place to cross verifies the real vs fake degree certificates, which diminishes the image of the university.

Aims of the Study:

This study will be confined to establishing the level of accessibility, availability and use of Information and Communication Technology in the Examination Management System of Maharashtra University of Health Sciences, Nashik.

Objectives:

The current study focused on the following objectives:

1. To identify the levels of availability of ICT for Examination Management in MUHS,Nashik.
2. To assess levels of accessibility of ICT for Examination Management in MUHS,Nashik
3. To study effective measures to increase efficiency in the resulting process with the help of ICT's.
4. To study the effectiveness of ICT in Examination Management System.

CHAPTER-2: REVIEW OF LITERATURE

Role of ICT in Higher Learning Institutions

The role of ICTs, particularly the Internet in the educational sector, plays an important role today, especially in the process of technology empowerment in educational activities. Education may be the industry with the most significant potential to foresee and reduce the negative impact of ICT. The ICT task of higher education isbeing called upon both at the micro and macro-level to improve the quality, expand access and improve operational efficiency throughout all functions of higher education. The ICT curriculum gives a broad view of the nature of technology, the use and implementation of a range of technologies, and the effect of ICT on oneself and society. The research is about the processes, the instruments and the strategies used to modify the behaviour of humans. ICT deals with new ways of communicating, inquiring, determining, and resolving problems. Improving and upgrading the quality of education and training is a fundamental priority, mainly when education spreads and develops. There are various ways in which ICT can improve the quality of education: through increased enthusiasm, engagement, the development of fundamental skills and the enhancement of teacher training. ICTs are also the means of change that can facilitate the shift in a learner-centred environment when used correctly. In order to make accessible the stimulation and stimulating thinking, activating material which will keep students engaged in the learning process, ICTs that can be in the form of photographs, television and computer interactive applications incorporating music, transcripts and multi-coloured moving Images are available. In universities and institutes of management, the use of online pedagogy is growing. The advent of the Wi-Fi network has also resulted in the development of the high-tech education system where students are made readily available for connectivity and transparency of topics. Students can now research the related information and understand it at their own convenience.

Impact of ICT on Higher Education

Teachers and students now have access to tools on the Internet to handle writing assignments for the identification and prevention of plagiarism and breaches of copyright. One of the significant advantages of ICTs in education is that they can increase the quality and quantity of education. However, they must be used correctly to do so.

1. Increasing use of ICTs has contributed to changes in teaching and learning at all levels of higher education systems (HES), resulting in improvements in quality.
2. In the four walls, ICT has modified the definition of learning as technology learning crosses the boundaries between universities and colleges. Students can now learn regardless of place and time. Individuals can access the data from anywhere they want and from anywhere.
3. The shift in professional practice in which teachers can now plan and integrate more sophisticated and practical projects through ICT instruments and tools and develop a new pedagogical approach.
4. This gives the institutions a new concept of the learning environment and improves the quality of education in order to produce quality products.
5. Higher education has become more critical in recent years since the government recognizes that a country's growth lies in education. The disparity between demand and the availability of higher education forced governments and institutions to establish policies for better use of ICT. Moreover, to bridge the gap, cooperation between public and private sectors must develop to implement ICT in higher education successfully.
6. The advent of ICT in academia changes the way education is conducted directly. Not only is distance learning possible, and close cooperation between various universities possible, it also paves the way for a new pedagogical approach, with the diffusion of knowledge and the unprecedented dissemination of information. New technologies have had a significant impact on people living, working and playing around the world.

Commitment of the Government towards ICT

For the successful delivery of ICT, the government's dedication is crucial, so it needs a budget for the ICT infrastructure every year. The Internet must be open and reliable as a service provider, and information submitted online must be processed safely. The Government of India is developing ICT and IT infrastructure through initiatives such as "digital India." Digital India is a Government of India project to link government departments and Indians. It is intended to ensure that government services are electronically made available to residents by raising paperwork. The project also requires preparing links between rural areas and high-speed internet networks. Digital India has three core parts. These include:

1. The creation of digital infrastructure
2. Delivering services digitally
3. Digital literacy

The project is scheduled to be completed by 2019. A two-way network will be created to support both service providers and customers. The scheme is managed and operated by the Digital India Advisory Group chaired by the Ministry of Communications and IT. It will be an inter-ministerial program, with all ministries and departments providing public health, education, legal services, etc. their services. The model of public-private partnership is selectively adopted. The National Informatics Center is also expected to be restructured. This initiative is one of India's top priority government projects (GOI).

The GOI has initiated a number of national and regional schemes that overlap with numerous private-sector ICT initiatives in schools and higher education. The draft National ICT Policy on School Education is available on the website of the MHRD. In order to improve ICT coverage in all 378 universities and 18064 schools, the 11th Five Year Plan is proposed for the launch of a National Education Mission by ICT. The mission is designed to focus on digitizing and networking all educational institutions, creating low-cost, low-energy connectivity devices and making bandwidth accessible for educational purposes. Agencies such as the MHRD Department of Information Technology (DIT) and the Telecommunications Department (DoT) are working in order to ensure that all online universities and remote campuses are fully operational. Nonetheless, specialized computing facilities in selected institutions will be given. Given the awareness and appreciation of ICTs in

educational matters, it would nevertheless be beneficial to have an oriented national policy structure at ICT level to provide the requisite guidelines, guidance and guidance for strategies at all levels of education.

The Indian higher education system has grown significantly to become more than 70 million students worldwide. Such an extension would not have been possible without the extensive use of ICT instruments.

Some of the notable initiatives of use of ICT in education in India include:

1. Indira Gandhi Open National University (IGNOU) uses teaching-learning technology using radio, television and the Internet.

2. National Enhanced Learning Technology Program: a concept similar to the MIT Open Learning Initiative. It uses television and Internet technology. "The idea is simple: to publish all their courses online and make them accessible to all." 3.Initiatives of Eklavya: Web and TV are used to facilitate distance learning. The Eklavya Learning Network is a joint IIT-IGNOU distance learning project. It was inaugurated on 26 January 2003 by Prof. Murli Manohar Joshi, Honorable Minister, HRD.

3. Brihaspati, an open-source e-learning platform, has been developed by IIT-Kanpur.

4. Prime Ministers, including IIM-Calcutta, have formed a strategic partnership with NIIT to provide virtual classroom programs. The Spoken Tutorial Project is a recent project of the "Talk to a Teacher" program initiated in 2015 by the Minister for Human Resources and Development, Government of India, in the National Mission for Education through Information and Telecommunications (ICT). The target group is the wider community, including school children, university students, working professionals, retired workers, teachers, coaches, scientists, app users and developers. To date, more than 12 lakh students have been educated in the Spoken Tutorial Program. Voiced Tutorial also allows students to take exams and earn certificates online.

Challenges of ICT in Higher Education

There are benefits of using ICT's in teaching. Along with the benefits there come challenges like the high cost of acquiring, installation cost, operation and maintenance cost. The cost of introducing ICT systems depends on the economic development of a country. For example, the cost in developing countries will be higher as compared to the industrialized country because other investment costs will be less in later.

1. Resistance to shift both students and educators from traditional methods of pedagogy to more innovative technologically oriented teaching and learning methods. In some cases, the attitudes of diverse management within and outside organisations towards the creation of ICT-related infrastructures, such as the Internet and computer procurement, are somewhat sluggish, with the government not providing support or assistance at all in other cases.
2. Inadequate ICT infrastructure such as computer hardware, software and bandwidth/access, but 4G technology has, to a certain degree, increased the question of internet bandwidth.
3. Lack of professional ICT workers. Most institutions are without computer literate teachers and ICT experts who help and manage Internet connectivity and computer application in the learning process. In a country like India, equipment costs are enormous, and the economy is battered and the currency severely devalued. It should be remembered, however, that the issue may not be the money, technology, but the government's will.
4. India lacks the necessary ICT infrastructural facilities. Again, most ICT infrastructures such as the Internet, telefax and e-mail depend on various service providers in India. These services are epileptic and attract unbearably high costs.
5. Implementation of ICT in educational institutions is one of the main challenges due to the high cost of installing and instilling the latest software and the cost of infrastructure development for institutions.
6. The ICT infrastructure is not adequate to achieve the goals of positive ICT incorporation in educational institutions. The creation, distribution, selection and evaluation of e-content requires large-scale networking of users and producers and the rights of intellectual property among

stakeholders are nevertheless the greatest concern for the integrated integration of ICT into education.

7. Many institutions across India offer graduate courses online, but are these courses suitable for jobs in India? Do these courses suit other traditional courses? Is it known that these institutions offer such online courses? It is necessary to answer these questions.
8. Apart from the lack of technological infrastructure, energy issues, network quality, lack of awareness of technology and use of technology with insufficient information added challenges to the progress of ICT implementation in educational institutions.

Higher Education & Examination

Higher education plays a crucial role in a country's development. It is considered to be a powerful means of building a society based on knowledge. In India, higher education faces challenges such as access, equity and quality challenges. During the 11th Annual Plan, India's government has taken several steps to improve access to higher education by implementing State-specific strategies, enhancing the value of higher learning through curriculum reforms, professional programs, networking, information technology adoption and distance education, as well as governance reforms. However, India remains behind the world's average and emerging countries like Brazil and China in terms of its Gross Enrollment Ratio (GER).

In terms of the number of institutions and third in terms of enrollment of students (after China and the US), the Indian higher education system has established itself as the most significant program. With new institutions in the private sector emerging in recent years, the quality of education has become a significant concern.

University tests are a way of teaching students skills. It also serves as a tool to determine a candidate has imparted information. University exams have a positive effect on students as well as teachers. It gives students a target they have to reach in a limited period of time. Testing is a way to organize and combine information, enabling a student to read different books and generate ideas to solve a certain question. In comparison, the test provides the instructor with a stimulus and a target for his job. Overall, tests are necessary, without testing, students and teachers are not

reliable and directing. Testing in a particular field is always an effective tool to assess the quality and quantity of knowledge. At the end of the academic session, university exams are performed for each level. There is hardly a month for which no review is carried out. For months, it continues to cause physical and mental stress both for students and for university administration.

Process of Conducting Examinations

The smooth conduct of exams is the product of many procedures and phases. The evaluation divisions of the university / educational board must work in a standardized and time-bound way. Any course's evaluation process begins by inviting applicants to apply for review forms. After candidates apply the test forms, the examination department performs the examination. Upon checking the voter roll numbers, candidates are given eligibility.

On the other hand, the examination division has developed exam centre s where candidates appear. It also appoints document makers and reviewers. The question papers are set in a time-bound way. The Examining Division stresses strict security and protection of issue records. The next step is to print and submit question papers to test centre s. The inspection division also ensures that question papers are adequately customized when examining banks / other institutions or co-ordinators /superintendents of the review centre. The examination will also be named by Superintendents, Invigilators, Inspectors and other support staff. The research division must also concentrate on the development of the required number of test centres. Protection of the test centres is also ensured through contact with the local authorities in the region. Regional administrative officers such as SDM, revenue officers, district collectors etc. are asked to make security arrangements, to track properly, and to ensure that exams are performed equally and smoothly. After the analysis is completed, copies of the response are collected and sent to the test controller to be checked by the examiners. The evaluators prepare the award lists and send them with the answer books to the controller.

It is clear that many methods for performing an analysis are involved. Full test work was done manually earlier. Now, both colleges and school boards are being investigated to incorporate ICT / computer technology. The recent University Grants Commission decision in NET Examination to simply provide the details about the

examination centers of candidates to the UGC/ universities concerned website and not to publish the numbers is one example of incorporating the technology and reducing the costs. A similar example is another recent decision by the Punjab School Education Board to install CCTV cameras in all state exam centres in Punjab to eliminate harassment during examinations. Improving the examination system will remove human intervention through ICT, as the technology promises compact storage, fast data recovery and unrelenting work. Global reforms in education and daunting ICT demands have dramatically changed the development of the ICT system and the use of ICT in education. ICT has a great deal of potential to change the entire test system.

Manual versus ICT Based Examination System

ICT may play an important role in enhancing the operation of all the proper test procedures involved. The manual inspection system is divided into well-defined physical branches, such as branch of secrecy, branch of assessment, branch of conduct etc. The reliance on manual work of all of these branches makes the entire process very sluggish and time consuming (Bhardwaj et. al., 2008). Lots of work is being conducted for successful integration of ICT into the examination system in different parts of the world. In his research paper Meng (2011) concentrated on integrating mobile technology into training and assessment to improve examination management and performance evaluation. Bhardwaj et.al. In a report titled, Automated Integrated University Assessment Program. (2011) explored the endless possibilities of combining ICT with the method of test. The study suggested that the Automated Integrated Evaluation System would ensure quality along with efficiency in the evaluation system and make online inquiries more convenient by reducing time and cost and breaking down geographic barriers, resulting in a marine improvement in the current manual review system.

National Open School (NISO) launched ICT-based On-Demand Evaluation (ODE) at elementary (Class 10th) and secondary (Class 12th) educational levels. Prasad (2006) established the academic and technical aspects of the on-demand review implementation strategies which are in service in the NIOS. The on-Demand exam is conducive to develop the learner's autonomy in study rate. Huang & Huang (2010) examined the online test method that is incorporated with Struts2, Spring and Hibernate. Based on the completion of the essential function of the online inspection

structure, the S2SH (Struts2+Spring+Hibernate) paradigm was adopted in their system separating view tier, control tier, business logic tier and data access tier into different components, as well as using web system development MVC pattern (Model View Controller) to achieve loose coupling between levels. In addition, direct access to the database was prevented by delaminating the system which strengthens the system's security control along with the Login validation and role authority technologies.

Compared with the ICT-based exam system, the emphasis in the manual system is on paperwork. Starting from that, inviting candidate admission forms involves a lot of expense manually in printing the exam forms and keeping records. This is possible to improve the same mechanism by incorporating ICT and encouraging the colleges and school education boards to apply online. The roll numbers are handed out manually by post to the candidates. It can also be modified in the form of e-cards where entire candidate data will be made available with the superintendent of the exam centre, and candidates can also access their examination roll numbers directly by opening the connection of the university and exam branch concerned website. The Chandigarh University of Punjab is currently working to implement the same.

Universities should set up a database of all qualified teachers, together with their email addresses that can be named as paper setters. The paper setters may be told directly that electronic mails on the advice of the respective committees. The question papers can also be submitted directly to the centre’s superintendents via electronic mechanisms.

Open learning university school, Punjab University, Chandigarh is currently following the same in the case of conducting house exams for distance learners at various study centers located across the state. After performing the review and evaluation of the copies of the response, the results should be made available to the candidates through the email addresses specified by them during the online application. Also, award lists should be made available online so that candidates can access this without any problems. Another copy sent to him by post can also complement the same.

The manual system review process takes too long, which results in both physical and mental stresses over the candidates and individuals involved in the process. It takes a very long time to plan and print out the test report gazettes. In the case of any difference on the candidate's or university score, it is not declared and candidates must attend the university again and again. It is tough for the weak candidate to clear the objection needed and get his outcome declared by the university. The same inconsistencies can be reported to candidates by electronic mail or in case candidates do not meet the eligibility criteria, there should be a clear procedure when filling out the online forms not to approve the form. In the case of manual examination program, students must either communicate via postal mail or visit university, even for minor examination queries. Occasionally their correspondences/applications are not traceable due to increased paper load in the examination divisions. Because of this, student have a lot of problems to face. Chances of mistakes are higher in the case of manual inspection method and whole work is time-consuming. Through the help of ICT technology, the same can be improved. Holding the exam record transparently is also a boring and daunting task. The use of ICT in the exam system will also bring greater clarity and allow the appointing authorities to further check the degrees and mark lists directly online. The implementation of an electronic assessment system will also help the learner appear directly in the assigned center and the printing, publishing and evaluation expense. On-line assessments are unbiased and easy to determine which further allows the results of the analysis to be announced without delay.

Role of ICT in Examination System

Information and communication technology (ICTs) is recognized as a diverse collection of technical equipment and communications tools. It also used knowledge generation, dissemination, processing and management. It comprises information, software, networks and media for data collection, storage, processing, communication and presentation (voice, data, text, images), and related services. ICTs can be divided in two sections, i.e. 1) information 2) networking infrastructure and networks (cellular, cable, satellite, postal) and all systems used (Internet, voice, postal, radio and television) and information technology (IT) related to data processing software and hardware, storage and other services;

In recent years, more and more international development organizations have taken advantage of ICT's ability to fund the education sector. UNESCO has played an important role in leading the campaign for Education for all to harness the potential of ICT. The Dakar Framework for Action, widely subscribed, acknowledges that these technologies (ICTs) are capable of flowing information, productive learning and creating more effective education services.' If we look at the application of the ICT to help the achievement of educational goals, it can be seen that it is not yet fully integrated into the development activities and understanding is still needed after almost a decade of using ICT to stimulate progress.

The examination is critical in the education system because it is a method for the academic assessment of the pupil. University exams have a stimulating effect on students and teachers alike. ICT is a useful tool to incorporate and automate different examination system operations at various administrative levels.

Sofield (2000) notes that many developing countries have not used ICT to the fullest extent possible to achieve improved socio-economic development. Increasingly, educational institutions now recognize the importance of ICT in education and examination reforms.

ICT is rapidly advancing technology as an array of new computing and networking devices. ICT has provided its users, whether individuals, groups, corporations, organizations or governments, with means for quicker and better communication, efficient storage, data retrieval and processing, and the sharing and reuse of information. ICT can offer better student services and to communicate with all examination program stakeholders. It needs quick, easy, effective and transparent communication and information exchange among different stakeholders of a university system, as it certainly can improve efficiency and performance due to the optimum potential of ICT. The essence of technology is that, as soon as it is real in everyday life, it becomes almost invisible. In his 2004 Independence address, former Indian President Dr. Abdul Kalam said, "There is a need for a more open and effective inspection, assessment and reporting system".

Maturity of ICT in Academics

Ganesh Hegde (2008) defines ICT as complementary research by Indian universities in his studies entitled Role of Information and Communication Technology in the Pursuit of Academic Excellence. This has led to dramatic changes in both learning needs and learning opportunities. Institutional institutions must incorporate the ICT program on campuses in order to take advantage of the multi-pronged offshoot of such innovation. Also, universities must build capacity and infrastructure for advanced technological changes.

Neeru Snehi (2009) said the ICT study at Indian Universities and Colleges: Opportunities and Challenges should respond to the demands of the 21st century in the Indian universities and colleges. Contemporary higher education systems strive to develop ICT skills as part of the core education system, provide infrastructure / completely appointed laboratories, funding and other resources needed to improve education quality. Applying ICTs to management and technology institutions in higher education will help many students in order to homogenize the quality of education in the very diverse scenario across colleges and universities set up in the country.

According to the EDC / Center for Children & Technology on August 5, 2009, teachers found a dedication between the ICT models of use and teaching in the essentials course in India, Turquie and Chile in their study The Role of the ICT in Enhancing Education in Developing Countries: Findings from an Evaluation of Intel ® Teaching Essentials Course in India, Turkey and Chile The most feasible option for Indian teachers was to include elements of the model of instruction in their classroom (i.e. open-ended questions) and ICT in post-class time. In Turkey, schools have incorporated ICT activities through planned laboratory and group work. However, Chilean teachers have employed systematic evaluation methods and investigation initiatives since their school day offer a block of time for programs. Nevertheless, progress cannot rely solely on the shoulders of the teachers, and it is a long-term, incremental process to make such improvements. Successful change requires continued commitment and investment through various aspects of the education system, including the physical and technical infrastructure, human resources, curriculum programs, standards and evaluations.

Dr R. Krishnaveni and J. Next. In his report, Meenakumari (August 2010) claimed that it was clear from the validation of the path model that all the established functional areas affected the administration of information. This shows that improving ICT use in these functional areas, particularly in general administration will enable higher education institutions to enhance the overall information management in a globally competitive environment.

Amar Jeet Singh (July 2011), identified by Mohini Bhardwaj as the age of technology, changed the lives of millions of people in their research. Today almost every Indian University offers ICT education, but its use in university teaching and administration is limited. Computing involves just typing or surfing the web, and many universities have not explored the full potential of ICT. ICT is a very useful tool for simplifying, accurate and efficient the university exam program. The application of ICT with the appraisal system offers endless opportunities. The Automated Integrated Evaluation System would improve quality and productivity within the evaluation system and make online problems simpler by eliminating time and costs and breaking up regional barriers, while adding marine change to the existing manual evaluation system.

The integration of ICT in higher education is inevitable according to Sukanta Sarkar (May 2012), in his study entitled "The Role of Information and Communication Technology (ICT) for the 21st century." The very high demand for higher education has boosted substantial private and public supply production. In the context of information systems management, ICTs are becoming more and more common. Computers ' strength in teaching is their ability to manipulate words and images–at the core of academic efforts. The creation of open educational resources (OERs) was also brought about by ICT. The use of ICT provides an open environment for the storage and re-use of information content, as well as for the interaction between teachers and students.

According to Agrawal Samiti (2012), exams have a significant role in any educational system in his research report on the reforms of exam systems at Maharashtra universities. Examinations help evaluate the knowledge and understanding acquired by students in an academic session and help develop pedagogy based on the results.

Over the years, the number of universities and students enrolled in higher education throughout the state has been rising significantly, with throughout one hundred schools affiliated with some universities. This has made the test logistics perfect. For each paper, a large number of students must be checked simultaneously at different locations according to the tight schedule of exams. During this method, it has become a serious challenge to preserve confidentiality, protection and timely implementation.

To overcome these challenges and keep abreast of changing times, reforms are needed in the traditional examination systems at Maharashtra universities. Recognizing this, under GR No the committee was created. Misc–2012 / Misc. Ca. Ka. 200/22/2003 On 20 July 2012, Vishi-3 submitted recommendations for the reform of the current examination system in universities in education, academics, resource allocation, Universities Act, etc.. The Committee thought that all the recommendations should be taken into account and not partly handled in a single package.

In developing countries like India, the lack of technology, internet access, and skilled trainers are the major challenges in providing ICT-based education services to the masses, especially rural masses. Mobile Internet penetration has stood at 23 per cent worldwide, with only 9 per cent of rural people using the internet, according to the last report released by The Indian Internet and Mobile Association (IAMAI) and the Indian Market Research Bureau (IMRB). The data clearly shows the slow rate of internet penetration in the country, in particular in the remote corners of India. Added to this is the lack of technical equipment and the reluctance of qualified teachers to share ICT-related content. "By 2010-2020, however, announced by the Government of India' the decade of innovation,' 6 years ago and initiatives like digital literacy pursued at full pace by the Modified Government of the NDA, I assume that the e-learning scenario will take a total turn in the country in the coming years, in particular in remote areas".

Breaking the Barriers

According to Chaturvedi, the present government needs to conduct the Training of Trainers (ToT) to produce resourceful workers to pursue various higher-level education initiatives at K-12. To tackle the problem of content for schools,

AISECT launched Advantage PRO Interactive Multimedia Content intending to offer low-cost and high-quality e-learning modules and solutions to the K-12 students in semi-urban and rural schools.

Implementing ICT to Empower Youth and Employment

ICT has played a pivotal role in youth empowerment and job creation. "We have launched a platform called' aisectonline.com' that empowers students at the grassroots level by enabling them to access education anywhere. At any time, i.e. according to their convenience," Srivastava remarks. Dr C V Raman University is the first university in India to have a community radio station on its campus to connect with the peripheral learners Working to create job opportunities for the skilled workforce,' rojgarmantra.com,' a rural job portal that is now considered to be the largest rural job placement project in the world, was also launched by the government a few years ago. The platform serves as a mediator between the 4 lakh job seekers registered with Rojgar Mantra and at the bottom of the pyramid are private & public sector companies working.

How AISECT helps in promoting rural education

They also pioneered the Indian Model ' Multipurpose IT Center.' It is a self-sustainable, demand-led, and scalable model that addresses rural India's multifaceted requirements for education & ICT services. This model is based on the clear and tested principle that just one market stream is not enough to help an entrepreneur in rural areas, and that the ICT infrastructure should be leveraged to install multiple services using the same network. AISECT has used ICT to provide the semi-urbanand rural India students with basic computer education and skills training. Over the years, numerous products and services, including skill development initiatives, recruitment assistance, banking facilities, mobile recharging, internet access and G2C services, have also been placed on the AISECT Centre's offers. To ensure sustainability and scalability, an enterprise network has been developed that involves a host of individual entrepreneurs across the world.

With Indian students forming the second largest pool of students opting for Massive Open Online Courses (MOOCs) along with the government's planned measures in the Union Budget 2016-17 to uplift India's digital literacy program. AISECT has also developed the' Multipurpose Center ' model in which the current

Education & Training Center network is used to provide a variety of services including skills development, capacity building, knowledge windows, banking and insurance services, maintenance and repair, sales of related products and services such as recharges, ticketing, financial services, education services and so on.

Aggarwal Committee Report

The number of students enrolled in higher education, the number of courses offered, the scope of institutes and so on have seen tremendous growth in recent decades. The exam system at universities has become quite complex and complicated as a result of this development. One of the main issues facing a university is the performance of unreliable tests and the issuance of fraud certificates. Question paper leakage undermines the main aim of the test, i.e. assessing the student's depth of knowledge and level of skills.

There have been several instances of university leakage in Maharashtra and serious media concerns regarding university capability have been raised in this regard. In this context, Hon Chief Secretary stated that immediate action must be taken to establish a reliable system in order to avoid the abovementioned incidences and for the Universities to conduct examinations properly.

Video GR No. In this respect. Misc-2012 / Pra. Ka. 200/12/Vishi-3 dated 20 July 2012 was formed as part of a panel of representatives of all universities chaired by IT Director. The Committee has been tasked with promoting the use of IT and introduction of the end-to-end framework for safe delivery of examination papers.

The committee has undertaken the following activities with the above objective: University Review Understanding-Present Scenario

Key issues and concerns in the University examination systems

Case Studies/ Best Practices for implementing exam management systems in India, technological guidelines, curriculum reforms, allocation of resources etc. to the smooth implementation of university exams, cost-benefit analysis of the proposed solution.

1. A robust university management system for automating all university processes

2. Technological recommendations as shown below
3. Active end-to-end ICT use for evaluation reforms
4. Authentication of students for exams to issue hall tickets Test bank / test paper banks institution
5. Safe distribution of review papers
6. OMR and Barcode technology in response sheet cover page
7. Barcode for each answering booklet page
8. Digital scanning and onscreen evaluation Review and publishing tests
9. Mobile re-evaluation program
10. Dematting of certificates and degrees
11. Many malpractice avoidance techniques
12. Use of the data center for teaching-learning activities
13. Physical safety measures
14. This included capacity building and assistance for handling
15. Decentralized, customizable, interoperable applications instead of centralized hardware and software upgrade solution
16. Selection of approaches based on quality and expense Academic Recommendations
17. Decentralization of review practices
18. CAP Centers are growing.
19. Improved focus in assessment on industrial preparation, practice and application-oriented projects.
20. Web Reviews
21. Whole university education by non-credit / certification classes, self-certification, extra marks/points, MOOC etc.
22. Postgraduate and Doctoral online thesis submission and review Plagiarism Detection Technology
23. Exam technologies such as Open Book, Take Home, etc.

Maharashtra Universities Act, 1994 Recommendations for Amendments and other related Universities Acts

1. Enable Question Banks / Question Paper Bank to be used
2. Responsibility for teaching and administrative IT preparation Participation of CoE and IT Director in the decision making process
3. Empowering differently qualified students Guidelines on the allocation of resources.
4. Strengthening the University Review Cell / Division
5. Faculty capacity building for successful ICT-based program management
6. Equipping test cells/divisions with the correct skilled staff to make students with various disabilities available
7. WCAG IT Solutions Compliance:
8. Use of ICT to enable students of various abilities Accessibility to examine centres
9. Financial assessment and innovation
10. ICT solutions financial criteria and modalities

Possibilities of ICT Based Examination System

Integrating ICT in the examination system has an enormous scope to improve the existing examination system. This type of ICT based system has many benefits in the Indian context. While ICT has many positive aspects, many challenges are facing its adoption in the country as well. Currently, the Indian evaluation system is changing from manual to ICT. ICT incorporation will enhance the functioning of the universities concerned as a whole and also help to improve the system's student satisfaction. In the initial phase, the ICT-based evaluation program is quite expensive. Some of the many challenges of integration of ICT in the Indian examination system are listed below:

1. Universities and school examination boards need much investment as technology is quite costly.
2. Lack of training in ICT is another challenge, for which proper training programmes need to be organized.

3. Less interest was shown by the state universities to integrate ICT because of lack of funds.
4. Maximum student population coming from a rural area which does not have access to the new technologies.
5. The paradigm shift of mindset of people using the existing manual system and training them.
6. Orientation and making students aware of adopting new technology before shifting to the ICT based examination system.

ICT based examination systems have the following possibilities and could help in the functioning of the examination; it needs:

1. To improve the coordination between different branches concerned with the conduct ofexaminations.
2. To improve the quality of services provided to the students by the examination branches of theuniversities.
3. To help in bringing transparent examination system which the students, parents and appointing agencies, can assesseasily.
4. To launch e-exams by adopting the technology to simplify the examination process with the help of computer-aidedcontrol.
5. To reduce the burden of people working in the examination branch and reduce dependency on the human resources.
6. To interlink and make communication easy between students, teachers, evaluators and parents.
7. To make easy monitoring of examination for the concerned authorities.
8. To minimize chances of examination malpractices and making the whole system very fair.
9. To introduce environmentally friendly examination system by reducing the consumption of paper.

Limitation of the Automated Integrated Examination System

Proper preparation and effective execution are one of the significant challenges in running an integrated system. Higher-level authorities should be committed to implementing the electronic integrated test program successfully. Higher-level officials should not be changed regularly as the new occupant would take his time to understand the new process. All the different test sections are

interlinked with each other so proper communication between different sections should be created. The integrated framework should be designed in such a way that a change requirement should not cause changes in other applications within a single application. The design and development should be such that automatic application integration should be possible.

In the era of Information Communication Technology, there is no say to say NO to universities in adopting this technology in examination system. It will certainly bring efficiency, transparency and reliability in examination system in universities. The benefits of adoption of this new technology for examination system management are discussed as under.

1. Successful implementation of the automated review system will bring substantial improvement in speed, reliability, efficiency, and accuracy in the examination process. The end user can profit most as under the click of his mouse, and he can get accurate information of the current status.
2. Total computerization of the examination system in a university may encourage the incorporation under a single umbrella of all sections/units/departments of the section of the exam.
3. The ICT in examination system could streamline the process for collecting examination fees, issue receipts to large numbers of students and keep track of cash flow.
4. The use of ICT in the examination system could centralize, secure and reliable the database of the candidates participating in the examination in particular.
5. Different sections of the review wing are linked in a networked environment system and all of these can exchange up-to-date information at various stages without replication of the database.
6. Through automating the operations which are currently carried out manually, a high degree of productivity could be added to the existing system. There will be a centralized, efficient and reliable database with the implementation of e-Governance. The entire data will be at a centralized database, thus reducing data redundancy.

7. It could improve the quality of the services provided to the

students/departments/sections concerned by implementing computerized window system and the online availability of information to the departments/sections of the University concerned.

8. The result production will require less human intervention (as much as possible) by automating all of the activities concerned. Employees at universities will also benefit from this as the operation will be more efficient, and data processing will be more straightforward.
9. The Computerized Statistical Data Analysis will make it easier for the management to see performance patterns at different levels. Data from the Management Information System (MIS) should encourage Top Level Management to make strategic decisions for the good of universities and students.
10. In addition to ensuring accuracy, integrity and data protection, the use of the Relational Database Management System for data storage of students will help minimize redundancy in the database.
11. The new system will help with decelerating results in the timely conduct of exams and the workers engaged in the tedious manual method will be burdened off.
12. The ICT system in the examination will be more transparent, reliable.
13. While competitiveness between various universities rises, the university's reputation will also shine brighter with the adoption of new program.

    The data generated by the students in the form of a database may give many academic benefits, e.g. it can be drawn in terms of statistical analysis of the results belonging to different faculties, courses, social groups, colleges (private / government) and different state and country areas. These data can be made available to university and non-university research students and suggestions for the study.
14. The processed data will be made accessible for outstation students and all stakeholders on the University's web site to reduce the number of quarries at counters.

Structure of Higher Educational Institutions in India

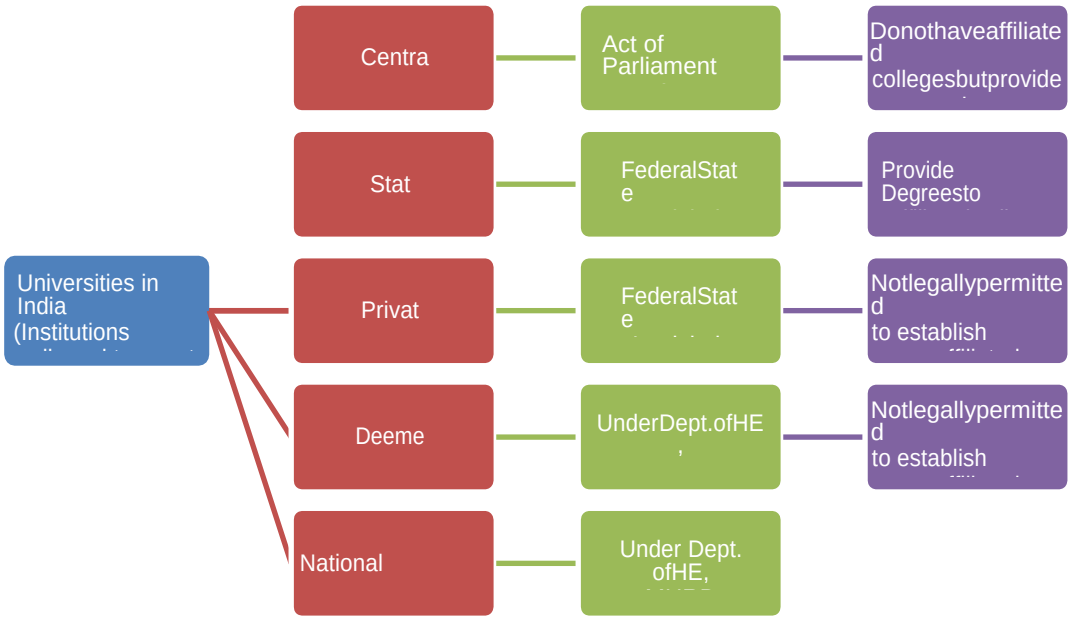

Figure 2.1 : Structure of Higher Educational Institutions in India

Universities in India

Number of Universities in India	
Status of University	**Total Number**
State Universities	347
Deemed to be Universities	123
Central Universities	47
Private Universities	237
Total	754
Source: http://www.ugc.ac.in/oldpdf/alluniversity.pdf (2016)	

Table 2.1 : Universities in India

The scenario of Present Higher Education of India

Although many explanations for the current scenario are given, they are all limited to decades of feudally controlled, colonial institutions operating with inadequate funding and undue political and bureaucratic intervention. In order to promote inclusive development, India should attempt to become a "knowledge economy." The three main fields to be based on ensuring a sustainable Indian higher education system that meets global standards are:

- Education standard-as regards facilities, staff, accreditation, etc.

- Education access-ensuring that needy and deserving students are not denied an education.
- Education Ethics-avoiding over-marketing of the education system.

Let's Make Higher Education Inexpensive

Higher education in India should be made affordable to all deserving candidates. For government-owned / sponsored entities, the fee structure is economical. Nevertheless, fees are beyond the ability of poor and deserving students in certain private sector institutions that have freedom to administer fees systems and, in spite of broad guidelines of certain state governments. Regulatory bodies such as UGC, AICTE, DDE, etc. All such schemes are being implemented in accordance with the increasing need for education and the idea of "education for all."

The University Grant Commission of India, also named UGC, is the country's sole grant agency. It also guides, determines and establishes standards of higher education institutions. Many technical bodies are responsible for approving classes, supporting educational institutes and awarding university degrees.

Understanding the 12th Five Year Plan

Recommendation of the Twelfth Five Year Plan "Higher Education" from a private sector viewpoint and proposes approaches for improving the quality of higher education. With the goals and recommendations underpinning the strategy, the report states that the private sector has played an active role in the sector's development. Private institutions currently account for 64% of the total number and 59% of national membership, compared to 43% and 33% a decade ago, respectively. In its Five Year Plans, the Indian Government also has given the sector the necessary impetus. India achieved a Gross Enrollment Ratio (GER) of 17.9 percent over the Eleventh Plan period (2007–12) from 12.3 percent at the start of the plan period.

The Indian system of higher education faces Three Fronts Challenges:

- Expansion: the 16% GER of India was well below the world average of 27% and of other developing countries like China (26%) and Brazil (36%) in 2010.
- Your Excellence:

    a) Staff Shortages: Faculty shortages in state and central universities respectively are 40% and 35%.

b) Accredited institutions: 62 percent of universities and 90 percent of schools, on the basis of NAAC accreditation, were on average or below average in 2010.
c) Low Citation Impact: The relative impact of India is half the average worldwide.
d) Ownership:
    a. In the GER of Higher Education, there are significant inequalities between states and the GAR in urban and rural areas as well as gender and class.
    b. Inter-State discrepancy: 47.9% in Delhi v / s. In Assam, 9 percent.
    c. Urban-rural division: 30% in urban areas v / s. In rural areas, 11.1 percent.
    d. Collective differences: 14.8% for OBCs, 11.6% for SCs, 7.7% for STs and 9.6% for Muslims.
    e. The disparity between the sexes: 15.2 per cent for women v / s. For males, 19 per cent.

Indian higher education - Road ahead

By the end of the twelfth plan period, the Indian higher education system can be projected to be more transparent and inclusive, provided the Government can create a permissible regulatory framework and put in place healthy mechanisms to implement, monitor and ensure quality. Ernst & Young LLP is a limited liability company, which is registered in India as part of the 2008 Limited Liability Company Act and plans to implement the following strategies:

- Merit-based tuition financing: admissions to meritorious candidates regardless of their financial history should be assured
- Education Internationalisation: This would include bringing different aspects of education (curriculum, teachers, etc) into line with international standards
- Enabling a Research Environment: providing sufficient funding for research and practical implementation of research
- High-quality faculty: The time is required for the development of a conducive environment and opportunities for attracting and retaining high-quality professorship

- Enhanced Learning Technology: Leveraging technology to improve learning experience would ensure better results
- Employability: The right way for an employable talent pool is to make education industry meaningful and realistic.

Qualities of a Good Examination

Figure 2.2- Qualities of a Good Examination and Eligibility Test

The new conciliation of education complies with 7R, which involves reading, writing, arithmetic, leisure, obligation, connection, privileges. In the same way, the review system should be restructured.

Timelessness is also one of the problem management methods. The three-hour cycle in the semester and annual exams is not enough. This is absolute prejudice against those students who can not write with a good pace but can describe it well and are not in a position to give their best in these exams because of their low speed. This definition of exams should be replaced with some new concepts which include the choice of two, three and four-hour periods which the students should choose before submitting their form. This shift of philosophy could prove better to deliver more positive and positive results.

As already mentioned, quantity and quality are a significant issue for examination and education systems in India, due to changes in trend in the national eligibility test (NET) almost ten-fold increasing the quantity of NET qualified

students, their quality and improving the system. This can be achieved by reintroducing the subjective cum descriptive model in NET, which enhances the qualitative rather than the quantitative dimension. During the Master's degree, students face the issue of long essays in exams but the admissibility test contains reasonable questions. This is a trend that is entirely indifferent to a student who cannot use his previous knowledge of trying to describe a new analytical problem. In that regard, the education system of colleges and universities should be consistent with the pattern of eligibility exams. Either the annual test pattern should be analytical, or the competence examination pattern should be descriptive.

Strong interaction and connection between the two examination systems are therefore required. In short, the most effective and effective way of improving the consistency of any examination method is by replacing the objective pattern with the composition of objective, short-term answer, type of essay and detailed types of questions. In other words, an assessment system should be structured to evaluate the maximum standard, and different areas of student activity which can lead to better screening and this improvement will improve the overall education system.

Role of ICT for Academic and Non-Academic Staff

In the statement of Poor (2008), ICT provides educational administrators with several facilities to do their tasks. He claimed that communication and information systems had changed the nature of higher education. He had also noted that there is an increase in the effectiveness and efficiency of management through the use of ICT.

It was also mentioned that ICT was utilized by the head of faculties for planning, and evaluation of academic affairs, financial affairs, and administrative affairs. According to OECS (2001), ICT is used in the maintenance of students' and staff records and for communication and documents management. It was indicated that ICT is used for:

- Students admission andrecords
- Teaching andEvaluation
- Examination results andtranscripts
- Finance database
- Human resourcedatabase
- Management ofInformation

HEALTHCARE SCENARIO OF MAHARASHTRA

Figure 2.3- Healthcare Scenario of Maharashtra

Introduction

Maharashtra is a state that occupies a large section of the Deccan plateau in the western peninsular region of India. It is India's second-largest state and third-largest state by country. The State has a demographic area of 307.731 km2 or 9.84% of India's total geographical area (118.816 sq mi). It is also the second-largest subnational entity in the world.

Overview of Maharashtra

Maharashtra is bordered west by the Arab Sea, north by the Indian states of Karnataka and Goa, east by Telangana, eastern by Chhattisgarh, Nagar Haveli and north by Gujarat and Dadra and north by Madhya Pradesh.

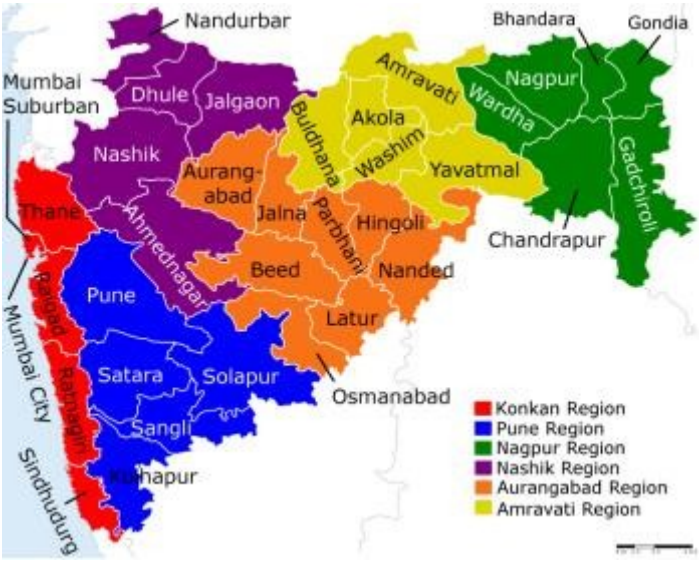

Figure 2.4- Maharashtra Geographical Spread.

Maharashtra Day remembers the reform on 1 May 1960 of Maharashtra from the Bombay State division. Maharashtra Day is often associated with the parade and political events and services that do not stand up to different private and public events that adulate Maharashtra history and traditions.

Sr. No.	Indicator	Maharashtra
1	Total Area	3,07,731 Sq. Km.
2	State Population	121,416 Million
3	Population Density	365 persons/ Sq. Meter
4	Sex Ratio	929 Females/ 1000 Males
5	Literacy Rate	83%

Table 2.2- Maharashtra Population.

Road Connectivity of Maharashtra:

At 267 452 kilometres, Maharashtra has the largest road network in India. 17

Maharashtra National Highways link to six neighbouring states. Maharashtra National Highways are 4688 kilometres long. Maharashtra is fitted with a vast state road network. As of March 2018, 99.5 percent of state villages were linked via all-weather roads. Busses, commonly known as the "ST," are the preferred mode of transportation for many of the population. Besides the government's bus services, private luxury busses also run between major cities. Other public transport modes, such as a seven-seater tempo, have become increasingly popular in semi-urban regions.

Railway Transport: Maharashtra is well-connected to other parts of the country, covering a 5,983 km railway network.

In Mumbai, at the Chhatrapati Shivaji Terminus and Churchgate the Central Railway and Western Railway zones of the Indian Railways are situated respectively.

The Nagpur Junction has Central Railway & South East Central Railway, Nagpur (North) & Nagpur (South East Central).

The Nanded division of the South Central Railway which covers the Maharashtra Marathwada area.

The Konkan Railway, a subsidiary of CBD Belapur based Indian Railways, serves the Konkan coastal region south of Mumbai and continues along its west coast.

Maharashtra airport: • Mumbai's Chhatrapati Shivaji International Airport (among the busiest Indian airports).

- Pune Airport for Dubai, Frankfurt and Sharjah flights.
- Babasaheb Nagpur International Airport Ambedkar.
- Domestic flights are served at Nashik Airport.

Main towns in Maharashtra: Mumbai Navi Mumbai Pune Nagpur Nashik Aurangabad Solapur Kolhapur Public Health India has a prominence in medical development in the State of Maharashtra. State, private and charitable sectors provide health facilities from basic to specialized health services. The public health services are designed to deliver effective, responsible, appropriate, comprehensive, preventive and curative public health care, focusing on improving maternal and child health. In

addition, facilities for public health take account of local needs, particularly for tribal and rural communities.

The Maharashtra government has created three-tier health infrastructure for comprehensive health services. The main level includes Sub-centers, Primary Health Centers (PHC) and Community Health Centers (CHC). The secondary level is the sub-district hospitals and regional hospitals, while well-equipped medical colleges and super-specialty hospitals in major cities are at their tertiary level.

Sr. No.	Type of Institution	No.
1	Sub-Centres	10,580
2	Primary Health Centres	1,814
3	Rural Hospitals(CHC)	360
4	Primary Health Units	193
5	Mobile Medical Units	40
6	Sub-District Hospitals	
	(i) 50 Beds	58
	(ii) 100 Beds	28
7	District Hospitals	23
8	Hospitals having Medical Colleges	16
9	Women Hospitals	13
10	Mental Hospitals	4
11	TB Hospitals	4

Table 2.3- Types of institution in Maharashtra.

Maharashtra's Present Healthcare System:

A number of medical and paramedical institutions, including Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy (AYUSH), have been developed to address the needs of medical professionals. Maharashtra consists of 10,580 sub-centers, 1,814 PHC, 360 CHC. Based on data from registered physicians, the approximate population of the doctor in the state is 1:1.365.

Reproductive and Children's Health Program (RCH)–II is being implemented to improve the health of children, thus reducing the Ratio of Maternal Mortality (MMR), Child Mortality Rate (IMR) and Total Fertility Rate (TFR). Under the Programme, expenses of 453.20 crore during 2015-16, of 459.01 crore in 2016-17 and of 207.86 crore in 2017-18 up to December 2015 were incurred.

Sr. No.	Health Indicator	Maharashtra
1	Infant Mortality Rate	19
2	Neo-natal Mortality Rate	13
3	Total Fertility Rate	1.8

Table 2.4- Health Indicator.

In Maharashtra, the National Vector Borne Disease Controlling Program (NVCPCP) has been initiated to prevent, diagnose, manage and monitor of vector-borne diseases. No. of deaths have been reported in 2017-18 are asfollows:

Sr. No.	Vector Born Disease	Cases	Deaths Reported
1	Malaria	15,076	14
2	Swine Flu	6,144	778
3	Dengue	7,648	50

Table 2.5- Vector Born Disease.

Challenges: Based on the increasing healthcare cost, Maharashtra needs to increase its health spending to more than Rs. 74 billion by 2018. Nevertheless, the increasing urbanization often demands an insight into the rising healthcare costs. In order to overcome the lack of public and medical facilities and the skill gaps of huge vacancies in rural hospitals and other centers as well as in PHCs, Maharashtra health budget needs to be a bit more ambitious.

King Edward Memorial Hospital (1,800 beds): The King Edward Memorial Hospital (KEM) is India's earliest medical education and health care facility situated in Mumbai. Created in 1926, the hospital has 1,800 beds, 400 staff, over one lakh hospital and two million ambulatory patients. Service is free for most of the vulnerable people in society. The hotel is funded primarily by the Municipal Corporation of Mumbai. For young physician lovers, it offers undergraduate, postgraduate and super specialization courses. The King Edward Memorial Hospital is India's first full-service Indian medical university.

- Lokmanya Tilak General Municipal Hospital (1462 beds): the Lokmanya Tilak General Municipal Hospital is a 1462 bedded hospital in Sion, Mumbai. It was established in 1947 and Lokmanya Tilak Municipal Medical College began in

1964. It is affiliated with the Indian Scientific Council.

- General Hospital of Sasson (1296 sleeping accommodations): Sasson General Hospital is located in Pune, established in 1867. B is connected to the hospital. J. Medical School. Medical University. There are 1296 beds in the hospital. The hospital serves the needs of urban and rural Pune patients. It is also a major referral point for many communities.
- Hospital Mangeshkar (800 beds): Hospital & Research Center Deenanath Mangeshkar is a charitable multi-specialist hospital in the heart of Pune. It was founded in 2001 and is now one of Pune's biggest hospitals. It is 6 acres with 800 sleeping rooms.
- Wadia Hospital (305 beds): The Wadia Maternity Hospital in Nowrosjee is the Mumbai hospital with 305 beds. The Nowrosjee Wadia Maternity Hospital specializes in providing women in all sectors of society accessible obstetrical and gynecological facilities. This hospital is named the most Promising Maternity Hospital in 2015 and the International Standard Award for Maternity Care Excellence in 2016.
- Bombay Hospital (725 beds): Bombay Hospital is 725 bedded hospital, situated in Mumbai. It was founded in 1950 by Shri Rameshwardasji Birla.
- Hospital Jaslok (364 beds): Hospital Jaslok is a private, full multi-specialty hospital with 364 beds. 364 beds are available. Philanthropist Seth Lokoomal Chanrai and Surgeon Shantilal Jamnadas Mehta founded the Jaslok Hospital and Research Centre in Mumbai. The hospital was officially opened on 6 July 1973. It is also accredited by NABH.
- Nanavati Superspeciality Hospital (350 beds): Nanavati Superspeciality Hospital is 350. Nanavati Hospital contains state-of - the-art facilities. At Nanavati hospital there are presently 350 consultants, 100 resident physicians, 475 nursing staff, and 1500 employees.
- Lilavati Hospital: Lilavati Hospital and Institute of Research is a private hospital in Mumbai. • Lilavati Hospital: The Lilavati Kirtilal Mehta Medical Trust established the hospital in 1978. The hospital began operating in 1997 with 10 beds and only 22 physicians. Today, it has 323 beds and is fitted with one of the biggest ICUs, 12 most sophisticated operating theatres, more than 300 consultants and almost 1 800 employees.
- Fortis Hospital (300 sleeping accommodation): Fortis Hospital, Mulund is a

JCI approved 300 sleeping accommodations for tertiary care and a variety of diagnostic and treatment services offered. They provide service in India like Chennai, Mumbai Navi, Mumbai, etc.

Medical education problems even before the creation of the Royal College of Surgeons, students from faraway countries had made their way to the universities of Nalanda and Taxila in India to study medicine. It is somewhat sad when today's 398 medical colleges in India struggle to provide their 1,2 billion large population with the much-needed healthcare.

Fixing medical issues is important for a country's health and well-being.

1. 1."A recent study in BMJ cited' India has one government doctor for every 11 528 and one nurse for every 483 people,' one government doctor for more than 11 000 patients
2. Redness is more relevant than clinical skills anybody who has large amounts of information can become a doctor in an evaluation system followed in India.

Creating Capabilities and Capacity through ICT for Medical Schools in India

As in many parts of the world, India faces major challenges in providing its people with adequate healthcare. Being one of the fastest developing economy in the world, a large part of the population is either unserved or underserved in health care. Approx. one million people die each year in India due to poor healthcare, mainly women and children.1 Access to healthcare is extremely restricted in rural areas as 80 percent of the country's experts live in urban areas. Around significant number of people, still do not have access to specialist care.

There is a severe shortage of medical professionals, including surgeons, radiologists, dentists and nurses. India, for example, lacks 600,000 trained physicians, while Indian medical schools produce the largest number of physicians in all nations worldwide. Obviously, any plan to increase Indian health care system capacity and enhance access to healthcare must tackle India's healthcare education system capabilities. More than 540 medical and dental institutions graduate annually with more than 50,000 professionals.

But even then, a general lack of medical professorship compounds the problem. Growing the medical education system's efficiency and effectiveness and

producing highly competent healthcare professionals is essential to the overall capacity of the healthcare system.

Harnessing ICT's Proven Capabilities in Education

Over more than two decades of worldwide education experience, it has become evident that ICT has a vast scope to improve the quality of education.

Numerous studies from all over the globe have shown that the use of technology allows instructors access and develop better educational materials and study in their teaching assignations has the positive impact of e-learning resources, such as the digital education content, curriculum, electronic teaching methods, Internet access and PCs in the hands of academicians and students.

- Most surveyed trainers say eLearning tools increase their capacity for project-based learning.
- E-learning facilitates the transition from teachers to students, increases the productivity of teachers and encourages them to act as facilitators rather than lecturers.
- The use of teachers ' personal PCs increases the productivity of teachers. 31% of teachers surveyed report further planning and preparation, while 47% conduct new tasks and existing tasks on a higher standard.
- Docensus meta-analysis found that students using technology are in the 66th percentile on average, while students without technology have in the 50th percentile on an average.
- A meta-analysis of over 500 studies shows that computer-based students tend to learn more in less time.

Many of India's leading medical colleges have taken note of and use adequate ICT resources in their strategies. "Especially in countries like India, the need for qualified medical professionals continues to grow," says Dr V. D. Patil, Dean at the Belgian Jawaharlal Nehru Medical College. "But most colleges fail to improve their ability to fulfil this need. A few leading medical schools in India are transforming the deployment of creative ICT solutions into a core part of their strategy to increase their capacity to meet a significant need for skilled healthcare professionals and to improve

the education received by their practitioners continuously. We have a higher level of skills and profitability in the workplace. This increased flow of highly qualified students to professional healthcare is essential to meet the needs of 1, 1 billion Indians and to prepare students for the increased utilization of ICT in healthcare environments.

Catalyzing a Comprehensive ICT Solution for healthcare education

With extensive experience in designing programs and solutions difficult societal and economic issues with suitable technology, Intel knows how public / private partnerships can power practical such projects. Intel also plays a leading role in these partnerships, driving global education and transformation in healthcare through technology, initiatives and policy leadership. Getting the right ICT instruments in the hands of both teachers and students proves a catalyst for stronger, immersive learning, which develops graduates with broader skills and better prepared for the changing challenges of healthcare today and in future. "Our collaborative work with colleagues in medical colleges, government agencies and NGOs has provided an opportunity to increase Indian medical colleges ' ability to better meet their country's requirements," Ashok Chandavarkar, Regional Manager Intel's Asia Pacific Healthcare Sales and Marketing Group, said.

Overview of the Digital Healthcare Education Model

The Digital Healthcare Education Model widely integrates health domain knowledge with different digital media (including animation, video, audio and presentations) into curriculum-based digital education products which meet carefully defined healthcare needs. The consequence is the highest quality material available to students in more areas and in more forms of medical education. It enables medical educators to address their specific educational goals in more ways and use more creativity in their course design. It also easily adapts to different learning styles and allows for self-reliant approaches to the content.

Online education in healthcare materials. The Education Technology Medical Education Research Center (MedRC EduTech) has developed content of the Digital Healthcare Education Model based on the curriculum given by the Medical Council of India (MCI), the body regulating the first and second years of medical education. Renowned Medical Teachers–an Indian and foreign dream team faculty–include video lectures supported by projections, graphics and animations. A full curriculum of the highest quality for the MBBS, as recommended by the MCI, is available in a digital format for access and use at any time and virtually anywhere. Teachers now have access to leading experts in their field to supplement and develop their own instructional methods and increasing their teaching ability.

Online Healthcare Education Software uses the SmarTeach e-learning system, which provides students at various medical colleges with an extensive library of online instruction. Over 50,000 hours of rich medical learning content are available, including over 2,000 eLectures. Participating colleges access content from a central database and avoid significant online content maintenance activities.

Digital Libraries: The Education Model of Digital Healthcare provides best practice for the conversion of existing university libraries into digital libraries. This can reduce the overall operating costs of the library for colleges over the long term, thus increasing access to library content for students. Through conjunction with a Wi-Fi networking infrastructure, students and faculty have access to the main learning resources of their library at any time.

Stories of success: 1. The ability and competitiveness of Sri Devraj Medical College needs campus ICT resources. "ICT infrastructure is a vital part of today's education–especially medical training," explains Dr A. V. M. Kutty, registrar and Head of the Department of Anatomy of the Sri Devraj Urs Medical College in Tumkur, Karnataka. His school already finds ICT resources central to adequate medical education and has implemented the majority of elements of the Virtual Healthcare Model. "We encourage students by having access to digital knowledge to learn the fields extensively and improve our faculty's capabilities." Dr. Kutty also considers ICT as part of the national lack of qualified faculty responses. "Technology increases faculty efficiency and makes medical schools more accessible for students, for example self-paced and distance learning." The college has built a comprehensive digital library with 100 desktop PCs and offers laptop computers for its undergraduate and postdoctoral students. Many other students buy laptops for themselves. Overall, 55% of the 2,000 campus students have a personal laptop computer. Student's access digital content and course material on their computers, view lectures, view lecture recordings, conduct internet research, and study international medical journals. The visual design of these multimedia resources encourages and accelerates learning. "We have definitely changed the learning process with our technical tools and made it easier to understand our subjects," says Pradeep Kumar student. "It makes it easier to understand lessons and at any time I can access and revisit digital information." The students also use a web-based alumni platform and experience a professional networking with their past graduates.

The faculty's use of laptop PCs and multimedia tools is central to the school's ICT-powered education strategy. "ICT is a must in the classroom environment in this age," says Dr. Kutty. "Medical education is evolving and we must keep pace. The visual presentations and ready access to information ensures that students learn subjects faster. "Dr. Kutty is pleased that ICT strengthens educational capacities." I had books and a chalkboard before. I will make the classroom experience more engaging with a laptop. I can screen surgery videos instead of flat slides. This is much simpler. "PCs make teachers more efficient, Dr. Kutty says." Our faculty invests less time in learning the fundamentals with digital resources in a classroom–as the basics are grasped more easily by students–and more time developing practical skills." Since the Sri Devraj Urs Medical College campus has access to WiFi, students as well as faculty and staff have access to content, coursework, research facilities and

collaborative relationships. "The exchange of resources and interaction has been reduced in size, both as teacher / student and student / student," explains Dr. Kutty.

Sri Devraj Urs Medical College is better prepared to provide healthcare to its students by implementing the digital healthcare education model. “We're getting our students better fitted,” says Dr. Kutty. “We are better educated and more open to the latest global medical information and innovations. This allows the institution to enhance our credibility and ranking year-round and to reinforce our capacity and meet rising healthcare needs in India”.

The Mediciti institute of Medical Sciences

Life-long medical education ICT resources. The institute in Hyderabad is a teaching hospital which seeks to develop an attitude of self-learning among its students and to provide them with the resources to achieve success as students as a whole immediately. The use of ICT resources by the school benefits all aspects of the project. "India is increasingly developing a national digital infrastructure that supports enhanced healthcare," says Hrishikesh Chitneni, Institute Director of Management. "This trend has resulted in increasing numbers of medical schools–including ours–taking ICT into their teaching and learning processes." The school has developed a digital library which offers self-sustaining learning modules for first-year courses as a basic infrastructure. In conjunction with wireless Internet Wi-Fi on campus students can access the material of the digital library using desktop computers in the library or using their own laptop computers. "The digital library enhances our education by making better-quality mate-rials more easily accessible to students whenever they need it," says Chitneni.

Many students buy their own laptop computers to access the digital resources available. Mr. Vishnu Roop Ravula, student in the first year, explains the advantages: "My PC helps me use the latest material available in my studies," he says. "It is easier to prepare for interviews, to work on case studies, to schedule reports and complete tasks," says the laptop. "I have access to a network of esteemed medical educators and healthcare professionals over the internet." The teachers note that student PCs improve the connection between teacher and student. "Interaction between students and faculty increases as they stay in contact via e-mails and chats outside the classroom," says Dr. K. V. Raghava Rao, head of the Institute. "In addition, it is now possible to review and correct assignments online.

Teachers in the classroom believe that ICT devices have a significant impact on education quality. "ICT has been an important part of improving teaching experience," states Dr. K.V.L.N. Sharma, Institute Professor and Vice President. "We can provide case studies, video and animations in real-time to enhance the learning process using tablets, digital content as well as internet access." The Institute plans to digitize the entire course curriculum over the long term and deliver it as on-demand eLearning platform based on the internet. "We have a chance of standardizing medical training and using these tools to create more doctors," Dr. Rao says.

Mahatma Medical College

ICT allows modern medical care. ICT is much more than an educational technique for the members of Mahatma Medical College in Puducherry–it is the foundation of the modern institution. "ICT plays an important role in today's health and health education," says Mr. K. Ravishankar, College Administrator. "ICT solutions like the digital library, eLearning resources and telemedicine provide a forum to enhance connectivity and teaching performance. In addition, the students must be introduced to the current information and trend, which is only possible through ICT. "The College has strong foundations to build on with the implementation of elements of the Digital Healthcare Education model. This begins with a full digital content and a comprehensive digital library. The digital content of the school today includes documented seminar videos, daily lectures and podcasts, so that students can regularly access key teachings. The school also plans to implement a potential eLearning system based on the curriculum. "This digital content helps students navigate whenever they need it individually," says Dr. Palanivel, Head of the Pulmonary Division. The digital library, which serves both the College and its associated hospital, has 400 desktop PCs to facilitate access to extensive research and reference material.

Personal laptop PCs for students in conjunction with Wireless Internet wireless Internet connectivity on campus connect them to digital content, a multitude of learning opportunities, and their instructors and fellow students. "Our students are allowed by clicking a button to access information from anywhere on campus," says Mr. Ravishankar. They connect with their teachers more and become more interested in their subjects.' Selva Raj, a second-year student, agrees. "I can easily access all on-campus medical materials, expert seminars and videos on medical cases. This

simplifies the planning of assignment and thesis materials. "In the classroom, teachers make full use of ICT devices like laptop computers and interactive panel boards. "We save time preparing our laptop classes," says Dr. Palanivel. "Then in the classroom, since we use digital imagery, we can present concepts in a number of ways, like images, diagrams, videos and animations. And again and again, if needed." "I think ICT actually reduces the divide between teacher and student and brings them closer together," remarks Ravishankar, "and this results in greater education." Dr. Palanivel agrees as instructor about the role of ICT in medical training today and tomorrow. "ICT's a gift to a college of medicine," he says. "As we evaluate additional ICT tools, it will continue to open new boundaries for education and learning."

The Proven Impact of ICT Tools in Medical Education

The above four medical colleges demonstrate the ability of ICT technologies to improve teaching and learning processes. Schools are also being made more successful as ICT technologies help them provide more students with education. Both sections of the "double effect"–-quality and growing number of medical professionals–help the Indian healthcare industry address the challenges of serving the large and diverse population of the country. By using the Digital Healthcare Education Model they use a well-designed, comprehensive solution that reflects a well-established strategy to slowly implement successful ICT resources.

CHAPTER-3: METHODOLOGY OF RESEARCH

Introduction

The main aim of the study is to explore the perceptions of teaching and non-teaching staff at Nashik University of Health Sciences (MUHS) on use of ICT in the management of examination systems.

Research Design

For this study the researcher at MUHS used a quantitative methodology which is also called descriptive research.

The quantitative approach is designed to estimate the problem by generating statistical information or translating data to functional statistics. The term "study survey" usually applies to a technique for collecting data from a given population or sample, and classically uses questionnaires or an interview as a tool for surveying.

Moreover, sample surveys are an important tool for the collection and analysis of data from selected individuals. As a quantitative investigation method, numerical data are collected to elucidate a precise phenomenon, therefore; the specific questions appear to be answered immediately using the quantitative investigation method.

To conduct this study, the researcher has established many questionnaires from previous inquiries that concentrate on information and communication attitudes and views of individuals in higher education, in particular in the field of examination system management.

Upon careful consideration, the questionnaire was modified from various sources according to the study requirements. The investigator divided the questionnaire into two parts: The following:

1. Demographic Part
2. StructuredQuestionnaire

The standardized questionnaire is divided into two areas based on:

1. ICT areas in Examination
2. ICT quality in Examination Management.

Sampling Criteria:

1. The college should be a health science institution under the MUHS

2. The respondent should be a Teaching Staffin health science colleges and administrative staff under the MUHS.

Sample Size:

This study will be conducted in Colleges of Maharashtra affiliated to Maharashtra University of Health Sciences, Nashik.

For sample size calculations, assumptions are as below:

- Anticipated population proportion (p) = 0.5 (50% as prevalence inunknown)
- Margin of error (m) = 5%(0.05)
- Z = 1.96 at 95% Confidence interval of thestudy
- q = 1 – p =0.5
- n = Samplesize

$$n = \left(\frac{Z}{m}\right) * \left(\frac{Z}{m}\right) * p\,(1-p)$$

$$n = \left(\frac{2}{0.05}\right) * \left(\frac{2}{0.05}\right) * 0.5 * 0.5$$

$$n = 400$$

Total 38 Examination Administrators are working in the Maharashtra University of Health Sciences, Nashik and as such, the entire examination administrator will be included in the study.

Sr. No.	Category	Sample Size
1	Teaching Staff	400
2	Examination administrator	38
Total		**438**

Total sample size for the study will be 438 samples.

Sample Element:

The teacher from affiliated health science colleges and examination staff of the MUHS is a sample

Sampling Frame:

The sampling frame has been developed using MUHS database since its authentic and under the purview of government of Maharashtra and other medical councils.

Sampling Method:

Cluster sampling is used as a sampling method where several clusters of people are formed from a population with equal opportunities for homogeneous characteristics. A simple random sample from the different clusters in the population is generated by this sampling method.

Survey Duration:

The survey was conducted using two approaches in April 2019. Questionnaire was distributed in person with guidance for administrative staff. In order to obtain a accurate response, a link with instructions was generated for Teaching Staff Online Questionnaire. It was sent to respondents. Descriptive statistics was performed on collected data from respondents. Adequate statistical test was also used to evaluate the study's objectives.

Statistical Measures Used

1. Chi-square test: The Chi-square test is designed to determine how likely a distribution is to be observed. It is also referred to as the "goodness of fitness," because it calculates how well the data distribution observed is in line with the distribution assumed to be independent of the variables.

   A Chi-square test is a non-parametric test and categorical data is analyzed. This means that the data have been counted and classified. It does not work with parametric or continuous data (for example, inch height). For example, if you want to check whether attendance affects how students conduct an exam, it is unappropriate to use test results (from 0-100) as data for a Chi-square test. However, the students would be grouped in the categories "Pass" and "Fail." In addition, Chi-square grid data should not be in the form of percentages or other than frequency (count) data.
2. Friedman Test: A nonparametric test comparing three or more matched or paired groups is the Friedman test. The Friedman test ranks the values from low to high in each set (each row). Every row is marked individually. It summarizes the ranks in each category (column). The P value will be small if the quantities are very different.

Ethics Principle followed by Researcher

Not so long ago, scholars were often careful to discuss their studies and ethical dilemmas, but today the environment is changing. The ethical action taken by the researcher is as follows:

1. Frankly debating intellectual property: the best way to avoid conflict on who should gain credit, and in what order to talk about these issues is at the beginning of a working relationship although many people still feel awkward with such subjects.
2. Being mindful of multiple roles: Before supervision or mentoring begins, both parties may avoid confusion by explaining the meaning and intent of the supervision relationship
3. Informed consent rules:
   a. The object of the research is the planned time and the research processes.

b. The rights of participants, as well as possible implications, to reject and withdraw from the research once it is underway.
c. Reasonably foreseeable factors that could have an impact on their willingness to take part, such as danger, discomfort or adverse effects.
d. Any potential advantages for science.
e. Security standards, such as data coding, storage, sharing and indexing and confidentiality infringement.

4. Respect for privacy and confidentiality: the protection of personal privacy and privacy is a key tenet of every research work.

Ethical Considerations in the Research

To social science research, ethical questions are of paramount importance. Essential ethical dimensions of social sciences study, including topics such as voluntary participation, respect for the dignity of the participants, privacy and confidentiality, preventing dissatisfaction and fair reporting. Discussion on these ethical factors is listed below in the research study:

Volunteer Participation

The principal issue in research in social sciences is that respondents should engage freely in research and that nobody should be forced to participate in the study. As respondents involved in the survey had to complete a long questionnaire, they were informed about the research goals and ensured confidentiality in data, so that they could participate voluntarily. The information was obtained by making personal visits to the respondents and those respondents who are not willing to attend are not included in the survey.

Respecting Participants Integrity

The participants were not asked personal questions. The study focused on organizational questions rather than on questions concerning personal issues. The research instrument did not have any questions that contributed to humiliation / damage to the participants.

Anonymity and Confidentiality

In the current study, the respondents information was confidential. Nonetheless, since data must be collected by visiting their organization through personal interviews and not through some other means of surveys, the identity of the respondent had been exposed to the researcher, so that privacy was not guaranteed. The respondents were told that the data would only be used to generalize the findings and that their company name or brand would not be listed explicitly in the study report or results.

Deception

In order to reveal the purpose of the visit, the researcher was given the name and affiliations of the university and school concerned when visiting the teachers and medical staff. Tilak Maharashtra Vidyapeeth is the University in this situation. The data were collected only after the respondents were told what data are needed and how it is used.

Plan for Primary Data Collection

Research Technique

The research methodology chosen for the current study are surveys because they allow sample item information to be obtained in response to questions. Survey data can be obtained from many respondents at relatively low cost without significantly increasing the time. Survey methods are ideal for large-scale sampling. The methodology of survey research is thus very appealing when sample generalization is a primary research goal. In fact, survey research methodology is the only alternative to provide a broader picture of the attitudes and characteristics of a larger population.

Contact Method

Two approaches were used to conduct a survey. Questionnaire was distributed in person with instructions to administrative staff. In order to obtain the correct answer, teaching staff Online Questionnaire connection with instructions was established with the aid of the programmer. This approach has provided the best response rate; the explanation is that the researcher is fully aware of the situation of the respondent. This gives the researcher more control over the process of data

collection. The main part of this approach is that the researcher can track participant responses. Apart from this geographical area of inquiry, the whole state of the Maharashtra region was also an excellent option to obtain timely and accurate information from respondents.

Research Instrument

A survey research questionnaire was used in the current research study to collect the data. When preparing the survey questionnaire, the questionnaire is based on the under-investigation issue. The key basis for selecting which questions should be included and which should be omitted from the study questionnaire is thus defined. The questionnaire was developed using detailed and carefully written questions that offer the opportunity for statistical interpretation and analysis. In order to get answers to close questions, a Likert scale consisting of 5 points was used.

Data Collection and Data Analysis

Data Collection

Data collection and final survey were conducted for both pilot surveys.

Pilot survey study: A pilot study was carried out to identify design flaws and to provide sample data for statistical analysis. The instruments were thus concluded to be valid and reliable. In addition, the unwanted / irrelevant elements have been eliminated. The instruments were also tested as follows:• Survey questionnaire wording • Questionnaire completion• Survey questionnaire layout Final Study: a full study of an estimated 400 sample respondents from the professor and 38 test management staff respondents was conducted. The researchers used online questionnaires to collect information from 400 teachers while the researchers collected data from Review Management Staff using 38 paper-based questions. The investigator has thoroughly followed the ethical guidelines in the ethical considerations of the work. In the final sample, all respondents received the survey questionnaire with a letter from the researcher informing them about the identity of the researcher and the university under which the study was conducted. The researcher told them that the survey was anonymous and completely confidential until they agreed to participate in this report. The respondents were also advised that they

would have full rights to withdraw from the survey at any point in time. The researcher took about 3 months to obtain all data from the respective interviewees.

Reliability of Measurement Instrument

The instrument has been tested and validated although it is important to consider the reliability when carrying out any survey. The current research study shows the reliability of the Instrument for Teachers and Administrative Staff Testing.

Teachers Instrument Reliability

Stats	
α	**N of Items**
.977	18

Table 3.1- Teachers Instrument Reliability

Exam Administrative Staff Instrument Reliability

Reliability Statistics	
α	**N of Items**
.942	21

Table 3.2- Exam Administrative Staff Instrument Reliability.

Both the instruments have a high reliability and can served the purpose for testing and conducting thesurvey.

CHAPTER-4: DATA ANALYSIS AND FINDINGS

This chapter has been dedicated to data analysis and findings from the data gathered by the researcher during his research study. The data has been analyzed using teachers and administrative staff's responses.

The various statistical measure has been used to analyze the data such as descriptive as well as inferential statistics. Hypotheses testing was alsoperformed.

Teachers Data Analysis

1. DemographicsAnalysis

Variable	Particulars	Freq.	%
Gender	Male	249	62.2
	Female	151	37.8
Age Group	≤ 30	39	9.7
	31 – 40	175	43.8
	41 – 50	122	30.5
	51 – 60	57	14.3
	> 60	7	1.7
Designation	Assistant Professor	135	33.8
	Associate Professor	116	29.0
	Professor	115	28.8
	Principal	34	8.4
Residential Area	Urban	256	64.0
	Rural	144	36.0
Type of College	Govt.	27	6.8
	Aided	34	8.5
	Private	339	84.8
College	Medical	32	8.0
	Dental	99	24.8
	Ayurveda	122	30.5
	Unani	04	1.0
	Homeopathy	66	16.5
	Allied	77	19.3
MSCIT Qualified	Yes	272	68.0
	No	128	32.0

Table 4.1 - Distribution of study respondents according their personal information

From the above table, it has been evident that male faculties are more than female faculties. If the ratio has been considered, it is approximately 60:40. On the other side, the faculties which belong to the age group of 30-40, as well as 40-50 years, are more as compared to the early ’30s and then 50 years.

When the designation of the faculties has been analyzed it come to the notice that associate professors and professors are more or less same in numbers whereas assistant professors are more compared to both of them so we can say that 40% constitutes assistant professor while associate and professors constitute around 30-30% each approximately. These faculties belong to urban areas more as compare to ruralareas.

The number of colleges is mostly private, which comprises of whopping near about 80% of samples as compared to government or aided ones.

If we see the computer usage skills, these faculties around 68% are MSC-IT qualified while only 32% are yet to pass their respective MSC-IT qualifications.

If we see the distribution of colleges according to their field of specialization, the Ayurveda and Dental colleges are more as compare to Medical, Unani as well as Homeopathy colleges.

2. Age-Gender

Age Group	Males		Females		Total	
	Freq.	%	Freq.	%	Freq.	%
≤30	13	5.2	26	17.2	39	9.7
31 – 40	117	47.0	58	38.4	175	43.8
41 – 50	76	30.5	46	30.5	122	30.5
51 – 60	37	14.9	20	13.2	57	14.3
>60	6	2.4	1	0.7	7	1.7
Total	249	100.0	151	100.0	400	100.0

Table 4.2 - Age and Gender wise distribution of the study respondents

From the above table of age-vs-gender, we can say that female faculty are more in the early 30s age group whereas male faculties are more in all age groups above 30 years of age

3. College-Gender

Type of College	Males		Females		Total	
	Freq.	%	Freq.	%	Freq.	%
Govt.	15	6.0	12	8.0	34	8.5
Aided	23	9.2	11	7.3	27	6.7
Private	211	84.8	128	84.7	339	84.8
Total	249	100.0	151	100.0	400	100.0

Table 4.3 - College type and Gender wise distribution of the study respondents

From the above freq. distribution table, we can say that the ratio of males is more in each type of college, whether its government or aided or even for that matter the private one. The female ratio is less as compared to male ratio in teachingstaff.

4. Residential Area –Gender

Residential Area	Males		Females		Total	
	Freq.	%	Freq.	%	Freq.	%
Urban	149	59.8	107	70.9	256	64.0
Rural	100	40.2	44	29.1	144	36.0
Total	249	100.0	151	100.0	400	100.0

Table 4.4 - Residential Area and Gender wise distribution of the study respondents

From the above freq. distribution table, it has been observed that maximum faculties are from urban areas as compared to rural areas — approximately its 60:40 ratio of urban to rural.

5. MSC-ITQualification

MSCIT Qualified	Males		Females		Total	
	Freq.	%	Freq.	%	Freq.	%
Yes	172	69.1	100	66.2	272	68.0
No	77	30.9	51	33.8	128	32.0
Total	249	100.0	151	100.0	400	100.0

Table 4.5 - MSCIT Qualified and Gender wise distribution of the study respondents.

The frequency distribution of the above table suggests that both male and female faculties are approximately close to each other when the criteria of MSC-IT passing are seen, and the story is same for non-certified faculties also. This ratio is around 70:30 of passing and non-passing.

6. MSC-IT vs.AGE

Age Group	MSCIT Qualified					
	Yes	%	No	%	Total	%
≤30	25	9.2	14	10.9	39	9.7
31 – 40	122	44.8	53	41.4	175	43.8
41 – 50	87	32.0	35	27.3	122	30.5
51 – 60	34	12.5	23	18.0	57	14.3
>60	4	1.5	3	2.4	7	1.7
Total	**272**	**100.0**	**128**	**100.0**	**400**	**100.0**

Table 4.6 - MSCIT Qualified and Age wise distribution of the study respondents.

From above frequency distribution table, we can say that the faculties who are in the age group of 31-40 years are more passed in MSC-IT in terms of percentage followed by 41-50 years.

The exciting fact is, faculties above 50 years of age showed more passing

percentage as compared the to those in early 30s.

7. MSC-IT vs.Area

MSCIT Qualified	Urban		Rural		Total	
	Freq.	%	Freq.	%	Freq.	%
Yes	166	64.8	106	73.6	272	68.0
No	90	35.2	38	26.3	128	32.0
Total	256	100.0	144	100.0	400	100.0

Table 4.7 - MSCIT Qualified and Area wise distribution of the study respondents.

From the freq. distribution table, it has been observed that the faculties who live in rural are more in percentage in terms of MSC-IT qualification as compared to urban faculties; this is quite interesting since the percentage is 74 vs. 65.

8. Availability of ICT Infrastructure

Variable	Particulars	Freq.	%
Configuration of ICT – Computer	i3	74	18.5
	i5	150	37.5
	i7	106	26.5
	Others	70	17.5
Configuration of ICT – Internet with 10 MbPs Speed	Adequate	370	92.5
	Inadequate	30	7.5
Configuration of ICT – Software (Tally)	Yes	324	81.0
	No	76	19.0

Table 4.8 - Availability of ICT Infrastructure

From the above table, its clear that there is a variation in the availability of ICT infrastructure according to the respondent's perception. It has been found that maximum colleges were using i5/i7 processing power computer systems with adequate internet speed, and they also have tally software.

9. ICT and its usage

ICT is applied in	Yes		No	
	Freq.	%	Freq.	%
College Affiliation	386	96.5	14	3.5
Examination Work	391	97.8	09	2.2
Financial Work	368	92.0	32	8.0
Student Welfare Activity	369	92.2	31	7.8
Academic related Activity	390	97.5	10	2.5
Alumni	317	79.3	83	20.7

Table 4.9 - Distribution of study respondents according to accessibility of ICT.

The above distribution table suggests that almost all that is 96 percent faculties say that they use ICT in their college affiliation work; the same is true with managing exams and financial affairs of the colleges. The areas where the ICT is low are connecting with alumni using ICT as well as student-related welfare activity; otherwise, faculties also said that they use ICT in their routine academic-related activities.

10. ICT and its usage in examination

ICT Use in Exam Work	Freq.	%
Always	296	74.0
Usually	57	14.3
Often	30	7.5
Sometime	13	3.2
Never	4	1.0
Total	400	100.0

Table 4.10 - Distribution of study respondents according to accessibility of ICT for Examination Management.

From the frequency distribution table we can say that a considerable number

of faculties have mentioned that near about 10% of them suggest they did not use ICT in examination to its fullpotential.

11. ICT and its effectiveness

ICT is applied in	Yes		No	
	Freq.	%	Freq.	%
ICT has improved efficiency between University & College	394	98.5	06	1.5
ICT has reduced paperwork in Examination Management System	362	90.5	38	9.5
ICT has improved transparency and accountability in college activities	390	97.5	10	2.5
ICT has increased efficiency & effectiveness in EMS	379	94.8	21	5.3
Internet facility used to support Examination Management System (EMS) is adequate	377	94.3	23	5.8
ICT has enhanced student's results efficiency in tracking	390	97.5	10	2.5
ICT facilitates for easy access of old batches students	362	90.5	38	9.5
Backup of data is taken by the college	301	75.3	99	24.8
ICT has made easier to verify students' fees status as well as their Internal Assessment Marks	378	94.5	22	5.5
ICT has helped to update Teachers Database	398	99.5	02	0.5
ICT helps to maintain accurate information	397	99.3	03	0.7
ICT reduces the loss of students' data and helps to maintain up-to-date students' data	381	95.3	19	4.7
Online declaration of results helps to reduce enquiries of students and parents	386	96.5	14	3.5
ICT has increased the participation of teachers in EMS	379	94.8	21	5.2
Challenges are faced by college staff during the use of ICT	186	46.5	214	53.5
College allow participating in ICT workshop organized by NGO/Govt../Colleges	356	89.0	44	11.0

Table 4.11 - Accessibility of ICT for Examination Management.

From the above frequency chart, we can say that the faculties face challenges in using ICT for examination purposes also the percentage of taking backup of data is quite low as well as compared to other aspects colleges lack in motivating their

respective faculties to undertake ICTworkshops.

The best effect is seen in conducting exams transparently, tracking student's results, teacher's information, and up to date accurate information of exam related data is highest one amongst the above one.

12. Overcoming ICT challenges

ICT is applied in	Yes		No	
	Freq.	%	Freq.	%
Provide Training to Teaching / Administrative Staff	172	43.0	228	57.0
Technical Staff Assistance	158	39.5	242	60.5
To organise Workshop	81	20.3	319	79.8
By Self-study	98	24.5	302	75.5
Improve IT Infrastructure	125	31.3	275	68.8

Table 4.12 - Distributions of study respondents to overcome challenges of ICT use.

From the above frequency distribution chart we can say that only 43% say that they got training in using ICT. Whereas on the other side, faculties do mention that they have technical assistance staff. They admit that they did not organize workshop or do self-study, and there is not much improvement in IT infrastructure.

13. ICT and its usage in different online applications of examinationsystem

Parameter	Scale	Freq.	%	P Value
Online updating of Teacher Database helps respective teachers to update their credentials from any place without any difficulty and without any correspondence	Strongly Disagree	8	2.0	<0.0001
	Disagree	1	0.3	
	Uncertain	4	1.0	
	Agree	106	26.4	
	Strongly Agree	281	70.3	
Online Question Paper Setting System helps to set better question paper with minimum errors such as spelling errors, grammatical errors, stem construction of question, duplication of questions and options, etc.	Strongly Disagree	7	1.8	<0.0001
	Disagree	3	0.8	
	Uncertain	8	2.0	
	Agree	95	23.8	
	Strongly Agree	287	71.8	
Online submission of Dissertation by the	Strongly Disagree	7	1.8	<0.0001

Parameter	Scale	Freq.	%	P Value
student to the college has increased efficiency, accountability, transparency,	Disagree	0	0.0	
	Uncertain	8	2.0	
	Agree	79	19.8	
printing and handling of multiple copies and it is eco- friendly system that has minimised printing cost of five copies	Strongly Agree	306	76.5	
Online submission of Dissertation by the college to the University has increased efficiency, accountability and handling of multiple copies as compared to submission of five physical copies	Strongly Disagree	6	1.5	<0.0001
	Disagree	2	0.5	
	Uncertain	8	2.0	
	Agree	72	18.0	
	Strongly Agree	312	78.0	
Online Internal Assessment Marks Entries module has increased efficiency, accuracy and accountability in submission of Internal Assessment Marks by the College	Strongly Disagree	5	1.3	<0.0001
	Disagree	1	0.3	
	Uncertain	0	0.0	
	Agree	68	17.0	
	Strongly Agree	326	81.5	
Online Entries of Practical Examination Marks has increased efficiency in submission of Practical Marks and has eliminated manual errors of the Examiners	Strongly Disagree	6	1.5	<0.0001
	Disagree	1	0.3	
	Uncertain	4	1.0	
	Agree	65	16.3	
	Strongly Agree	324	81.0	
Online Entries of Theory Marks at Central Assessment Programme (CAP) has increased efficiency, accountability as well as has eliminated manual errors of the examiners	Strongly Disagree	6	1.5	<0.0001
	Disagree	2	0.5	
	Uncertain	10	2.5	
	Agree	54	13.5	
	Strongly Agree	328	82.0	

Table 4.13 - ICT role for Stakeholders in various Online Applications of Examination Management Systems

The above table suggests that after testing of hypothesis it is found that ICT does help faculties in effective management of examination systems; since all the statements which has been tested for which were talking about updating of information, dissertation submission or evaluation of marks or in fact for that reason the entries of the marks all suggests that the ICT had helped them in great way and same has been proved using statistical test.

14. ICT and time factor

Parameter	Scale	Freq.	%	P Value
Online publication of Time Table of University Examinations helps the students and the colleges to access it from anyplace	Strongly Disagree	6	1.5	<0.0001
	Disagree	0	0.0	
	Uncertain	0	0.0	
	Agree	63	15.8	
	Strongly Agree	331	82.7	
Online Publication of Theory Centres of University Examinations helps the students / colleges to view it from any place and it helps them to measure convenience of the Theory Centre	Strongly Disagree	6	1.5	<0.0001
	Disagree	1	0.3	
	Uncertain	5	1.3	
	Agree	70	17.5	
	Strongly Agree	318	79.5	
Online availability of Hall Tickets and Seat Summary eliminates postal delay and has increased efficiency in distribution process to the respective students	Strongly Disagree	6	1.5	<0.0001
	Disagree	1	0.3	
	Uncertain	1	0.3	
	Agree	67	16.8	
	Strongly Agree	325	81.2	
Online issuance of appointments of Centre Incharge / Centre Observer / IVS / CAP Custodian / Practical Examiners helps to their appointment from any place without carrying physical copy of appointment with quick and easy access in their logins	Strongly Disagree	6	1.5	<0.0001
	Disagree	0	0.0	
	Uncertain	1	0.3	
	Agree	72	18.0	
	Strongly Agree	321	80.3	
Online CCTV monitoring system facilitates to have access to keep watch on Examinees in the Examination Hall that helps to curb down malpractices at Theory Centre Level	Strongly Disagree	7	1.8	<0.0001
	Disagree	3	0.8	
	Uncertain	4	1.0	
	Agree	75	18.8	
	Strongly Agree	311	77.8	
Online forwarding of Dissertation copy for evaluation by the Subject Expert / Evaluator has eliminated postal delay and has increased efficiency of delivery, accountability, improvement in assessment quality as well as it facilitates submission of evaluation report on a single click	Strongly Disagree	7	1.8	<0.0001
	Disagree	5	1.3	
	Uncertain	12	3.0	
	Agree	66	16.5	
	Strongly Agree	310	77.5	

Table 4.14 - ICT role in various Online Applications for Effective Examination Management Systems.

From the above table we can say that the hypothesis has been tested and its found that all the statements of the test has passed and proved to be good since the p-

value is less than 0.05 and hence we can say that whether it's about availability of hall tickets or availability of seat summary or forwarding dissertation for external evaluation or for that matter appointing the examination incharge or other staff is easier with ICT which saves lot of time and thus it makes examination system more efficient.

15. ICT and examination ecosystem

Parameter	Scale	Freq.	%	P Value
Online issuance of Hall Tickets and various Appointments (Centre Incharge / Centre Observer / IVS / CAPCustodian / Practical Examiners) has reduced printing cost of the University	Strongly Disagree	6	1.5	<0.0001
	Disagree	1	0.3	
	Uncertain	3	0.8	
	Agree	70	17.5	
	Strongly Agree	320	80.0	
With the help of ICT online submission of marks is adopted and as such it has helped to reduce malpractices of change in marks in Theory Examination, Practical Examination and Internal Assessment Examination from the system	Strongly Disagree	6	1.5	<0.0001
	Disagree	3	0.8	
	Uncertain	6	1.5	
	Agree	55	13.8	
	Strongly Agree	330	82.4	
Online Declaration of University Results helps the students and colleges to view the status of their results	Strongly Disagree	6	1.5	<0.0001
	Disagree	0	0.0	
	Uncertain	1	0.3	
	Agree	49	12.3	
	Strongly Agree	344	86.0	
Online disbursement of advances of Theory, Practical and Central Assessment Programme (CAP) helps Colleges to instantly utilise the funds for smooth conduct of examination and it eliminates loss of Demand Draft in transit and postaldelay	Strongly Disagree	5	1.3	<0.0001
	Disagree	1	0.3	
	Uncertain	9	2.3	
	Agree	65	16.3	
	Strongly Agree	320	80.0	
Optimum use of ICT has helped paperless work at College / University Level and has drastically brought down wastage ofpaper	Strongly Disagree	6	1.5	<0.0001
	Disagree	6	1.5	
	Uncertain	8	2.0	
	Agree	58	14.5	
	Strongly Agree	322	80.5	

Table 4.15 - ICT role for MUHS in various Online Applications of Examination Management Systems.

From the above table we can say that the hypothesis has been tested and its found that all the statements of the test has passed and proved to be good since the p-value is less than 0.05 and hence we can say that the ICT has helped in curbing the malpractices as well as disbursing the paper to respective centers in real time can make the examination system run smoothly and hence there is less paper work will be observed using ICT in managing examination systems.

Hypothesis – 1: Whether there is any difference in the frequency of perceptions of teachers working in medical colleges regarding the application of ICT?

Statistical Test: Friedman chi-square test

Hypothesis:

H0: There is no difference in the frequency of perceptions of teachers working in medical colleges regarding the application ofICT.

H1: There is a difference in the frequency of perceptions of teachers working in medical colleges regarding the application ofICT.

Level of Significance $\alpha = 0.05$

Test Statistics	
N	400
Chi-Square	157.483
df	5
Asymp. Sig.	.000

Observation: χ^2 (5) = 157.483, p-value<0.001

Conclusion: Since p-value (0.000) is less than level of Significance (0.05), alternate hypothesis is accepted hence it is concluded that there is difference in the frequency of perceptions of teachers working in medical colleges regarding the application of ICT**.**

To find out whether difference lies or not, we refer to Ranks table.

Statements	Mean Rank
ICT is applied in-Examination Work	3.66
ICT is applied in-Academic related activity	3.65
ICT is applied in-College Affiliation	3.62
ICT is applied in-Student Welfare Activity	3.49
ICT is applied in-Financial Work	3.48
ICT is applied in-Alumni	3.10

From Ranks table it can be seen that top 3 mean rank were ICT application in examination work, ICT application in academics related activity and ICT application in college affiliation procedures.

Hypothesis – 2: Whether there is any difference in the frequency of perceptions of teachers working in medical colleges regarding overcoming the challenges faced by implementation of ICT?

Statistical Test: Friedman chi-square test

Hypothesis:

H0: There is no difference in the frequency of perceptions of teachers working in medical colleges regarding overcoming the challenges faced by implementation of ICT.

H1: There is a difference in the frequency of perceptions of teachers working in medical colleges regarding overcoming the challenges faced by implementation ofICT.

Level of Significance α = 0.05

Test Statistics	
N	400
Chi-Square	128.164
df	4
Asymp. Sig.	.000

Observation: χ^2 (4) = 128.164, p-value<0.001

Conclusion: Since p-value (0.000) is less than level of Significance (0.05), alternate hypothesis is accepted hence it is concluded that there is difference in the frequency of perceptions of teachers working in medical colleges regarding overcoming the challenges faced by implementation of ICT**.**

To find out whether difference lies or not, we refer to Ranks table.

Statements	Mean Rank
College overcomes challenges – Provide Training to Teaching / Administrative Staff	3.28
College overcomes challenges - Technical Staff Assistance	3.20
College overcomes challenges - Improving IT Infrastructure	2.99
College overcomes challenges - By Self-study	2.82
College overcomes challenges - To Organise Workshop	2.71

From Ranks table it can be seen that top 3 mean rank were – Providing training to teaching staff, Usgae of technical staff assistance, Improving IT infrastructure.

Hypothesis – 3: Whether there is any difference in the frequency of perceptions of teachers working in medical colleges regarding ICT has made examination management system easier and user-friendly?

Statistical Test: Friedman chi-square test

Hypothesis:

H0: There is no difference in the frequency of perceptions of teachers working in medical colleges regarding ICT has made examination management system easier anduser-friendly.

H1: There is a difference in the frequency of perceptions of teachers working in medical colleges regarding ICT has made examination management system easier anduser-friendly.

Level of Significance α = 0.05

Test Statistics	
N	400
Chi-Square	136.189
df	17
Asymp. Sig.	.000

Observation: χ^2 (17) = 136.189, p-value<0.001

Conclusion: Since p-value (0.000) is less than level of Significance (0.05), alternate hypothesis is accepted hence it is concluded that there is difference in the frequency of perceptions of teachers working in medical colleges regarding ICT has made examination management system easier and user-friendly**.**

To find out whether difference lies or not, we refer to Ranks table.

Statements	Mean Rank
Online updating of Teacher Database helps respective teachers to update their credentials from any place without any difficulty and without any correspondence	8.68
Online Question Paper Setting System helps to set better question paper with minimum errors such as spelling errors, grammatical errors, stem construction of question, duplication of questions and options, etc.	8.74
Online publication of Time Table of University Examinations helps the students and the colleges to access it from any place	9.88
Online Publication of Theory Centres of University Examinations helps the students / colleges to view it from any place and it helps them to measure convenience of the Theory Centre	9.52

Statements	Mean Rank
Online availability of Hall Tickets and Seat Summary eliminates postal delay and has increased efficiency in distribution process to the respective students	9.72
Online issuance of appointments of Centre Incharge / Centre Observer / IVS / CAP Custodian / Practical Examiners helps to their appointment from any place without carrying physical copy of appointment with quick and easy access in their logins	9.65
Online issuance of Hall Tickets and various Appointments (Centre Incharge / Centre Observer / IVS / CAP Custodian / Practical Examiners) has reduced printing cost of the University.	9.59
Online CCTV monitoring system facilitates to have access to keep watch on Examinees in the Examination Hall that helps to curb down malpractices at Theory Centre Level.	9.35
Online submission of Dissertation by the student to the college has increased efficiency, accountability, transparency, printing and handling of multiple copies and it is eco-friendly system that has minimised printing cost of five copies	9.24
Online submission of Dissertation by the college to the University has increased efficiency, accountability and handling of multiple copies as compared to submission of five physical copies	9.33
Online forwarding of Dissertation copy for evaluation by the Subject Expert / Evaluator has eliminated postal delay and has increased efficiency of delivery, accountability, improvement in assessment quality as well as it facilitates submission of evaluation	9.16
Online Internal Assessment Marks Entries module has increased efficiency, accuracy and accountability in submission of Internal	9.78

Statements	Mean Rank
Assessment Marks by the College	
Online Entries of Practical Examination Marks has increased efficiency in submission of Practical Marks and has eliminated manual errors of the Examiners	9.68
Online Entries of Theory Marks at Central Assessment Programme (CAP) has increased efficiency, accountability as well as has eliminated manual errors of the examiners	9.68
With the help of ICT online submission of marks is adopted and as such it has helped to reduce malpractices of change in marks in Theory Examination, Practical Examination and Internal Assessment Examination from the system	9.74
Online Declaration of University Results helps the students and colleges to view the status of their results	10.16
Online disbursement of advances of Theory, Practical and Central Assessment Programme (CAP) helps Colleges to instantly utilise the funds for smooth conduct of examination and it eliminates loss of Demand Draft in transit and postal delay	9.56
Optimum use of ICT has helped paperless work at College / University Level and has drastically brought down wastage ofpaper	9.56

From Ranks table it can be seen that top 3 mean rank were online declaration of results, Online publication of timetable, Online marks entries systems.

Administrative Staff Data Analysis

1. GenderComposition

Gender	Frequency	Percentage (%)
Male	30	78.9%
Female	08	21.1%
Total	38	100.0%

Table 4.16 - Gender-wise distribution of Examination Administrator.

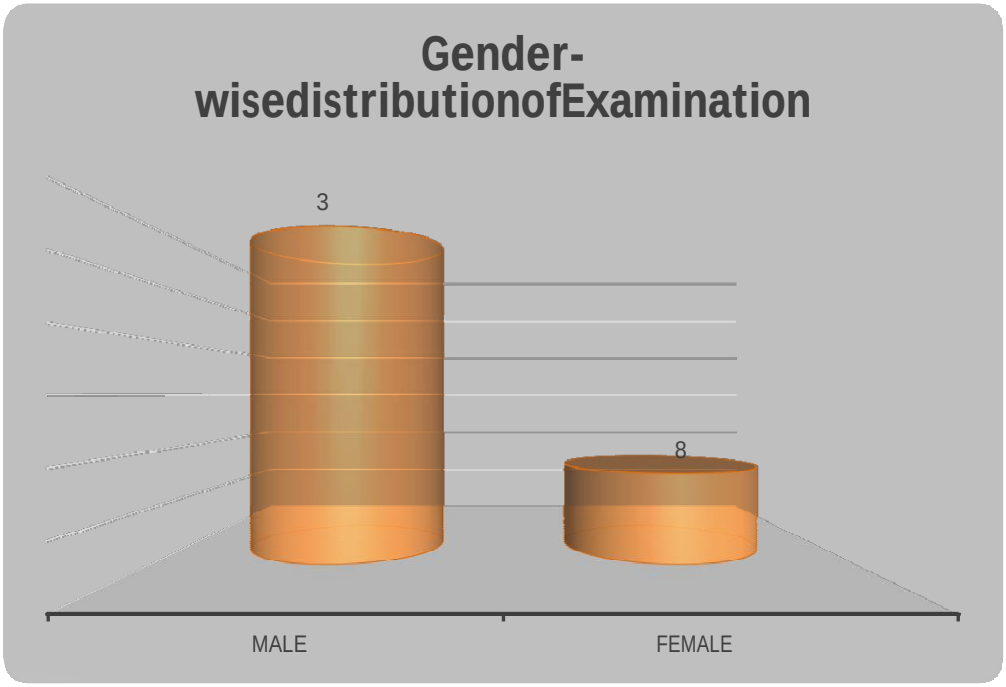

Figure 4.1 - Gender-wise distribution of Examination Administrator

From the above table and graph we can say that male examination administrators are more since they comprise maximum percentage of the sample population.

2. Age Composition

Age Group	Frequency	Percentage (%)
30 – 40 Years	12	31.6%
41 – 50 Years	19	50.0%
51 – 60 Years	07	18.4%
Total	38	100.0%

Table 4.17 - Age-wise distribution of ExaminationAdministrator

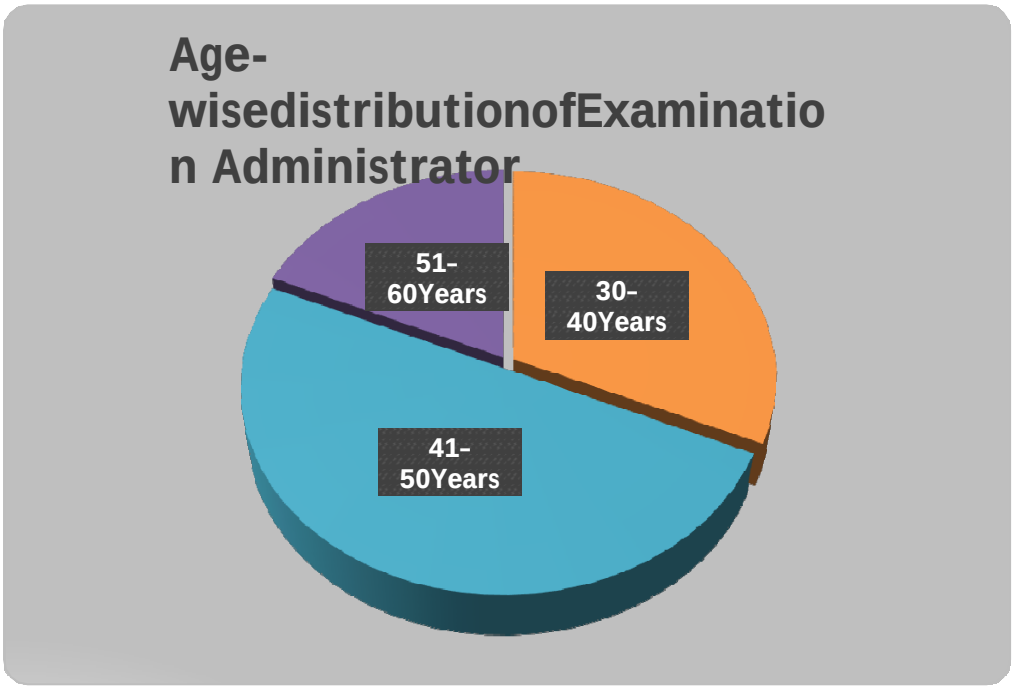

Figure 4.2 - Age-wise distribution of ExaminationAdministrator

From the above table and graph we can say that the examination administrator staff majorly belongs to 41-50 years age group. Followed by 30-40 years, least number of staff is above 50 years of age group.

3. Area wise dispersion of examination administrativestaff

Area	Frequency	Percentage (%)
Urban	33	86.8%
Rural	05	13.2%
Total	38	100.0%

Table 4.18 - Area-wise distribution of Examination Administrator.

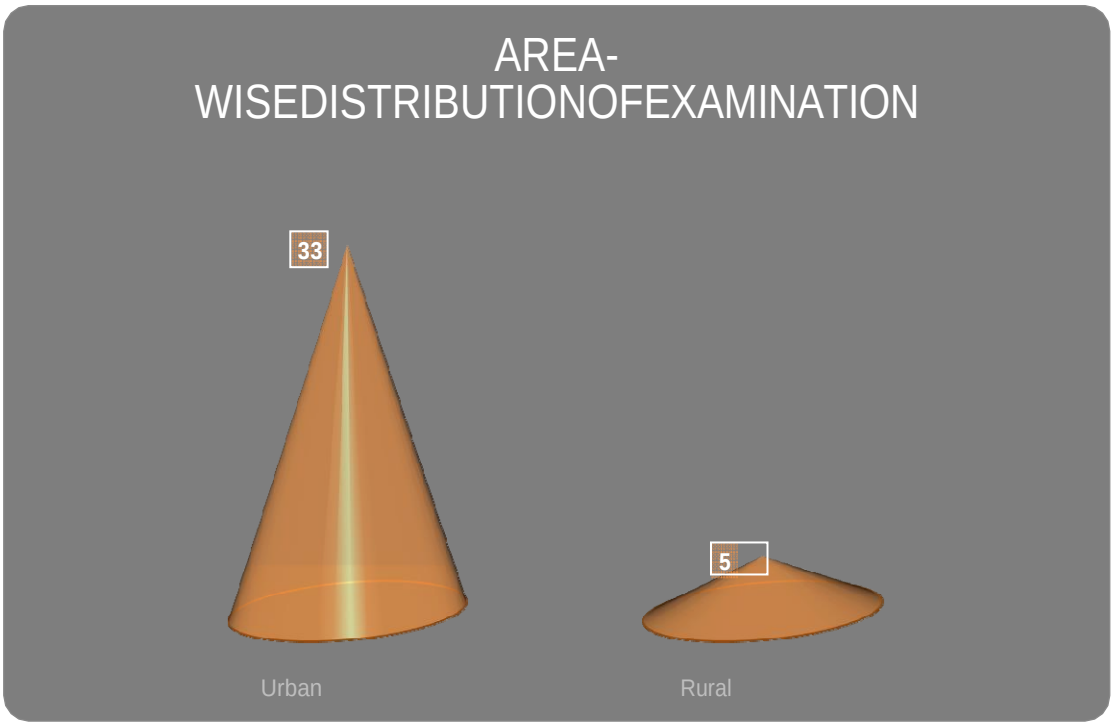

Figure 4.3 - Area-wise distribution of ExaminationAdministrator.

From the above table and graph we can say that almost 86% of the exam administrative staff is dispersed and concentrated in ruban area as compare to rural area.

4. Exam Administrators educational qualification composition

Educational Status	Frequency	Percentage (%)
Under Graduate	20	52.6%
Post Graduate	18	47.4%
Total	38	100.0%

Table 4.19 - Educational Qualification-wise distribution of ExaminationAdministrator

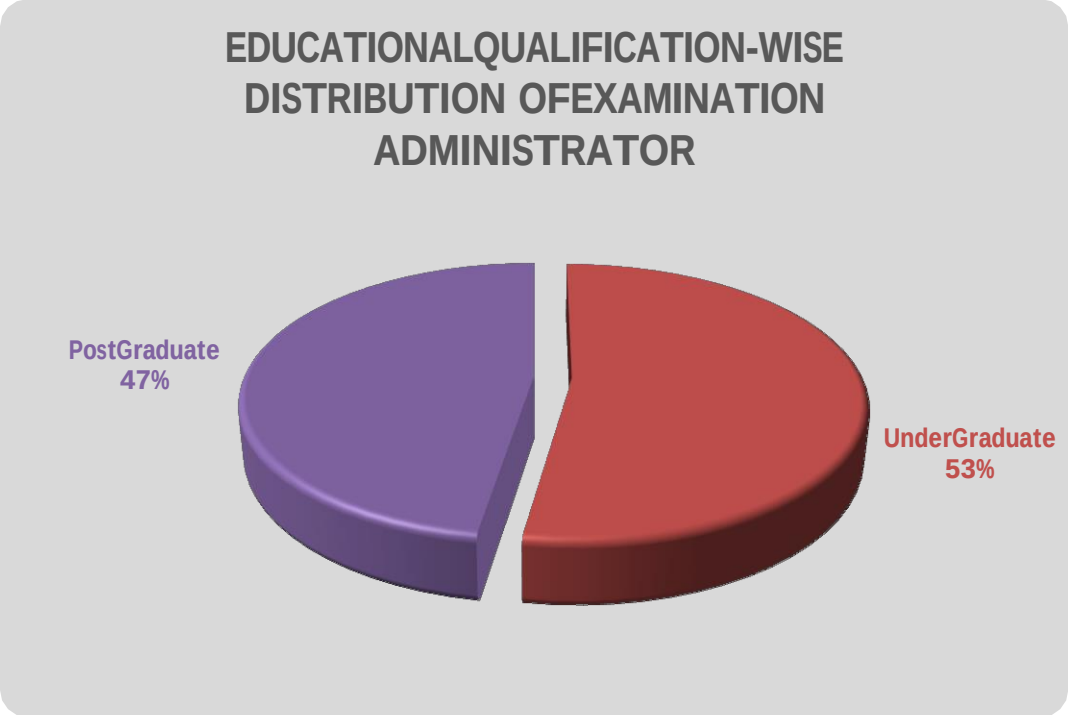

Figure 4.4 - Educational Qualification-wise distribution of ExaminationAdministrator

From the above table and graph we can say that maximum exam administrators were undergraduate and rest are postgraduate. Which also suggest that the proportion of PG to UG is marginally lower.

5. MSC-IT Qualified ExamAdministrators

MSCIT Qualified	Frequency	Percentage (%)
Yes	37	97.4%
No	01	2.6%
Total	38	100.0%

Table 4.20 - Distribution of MSCIT Qualified ExaminationAdministrator.

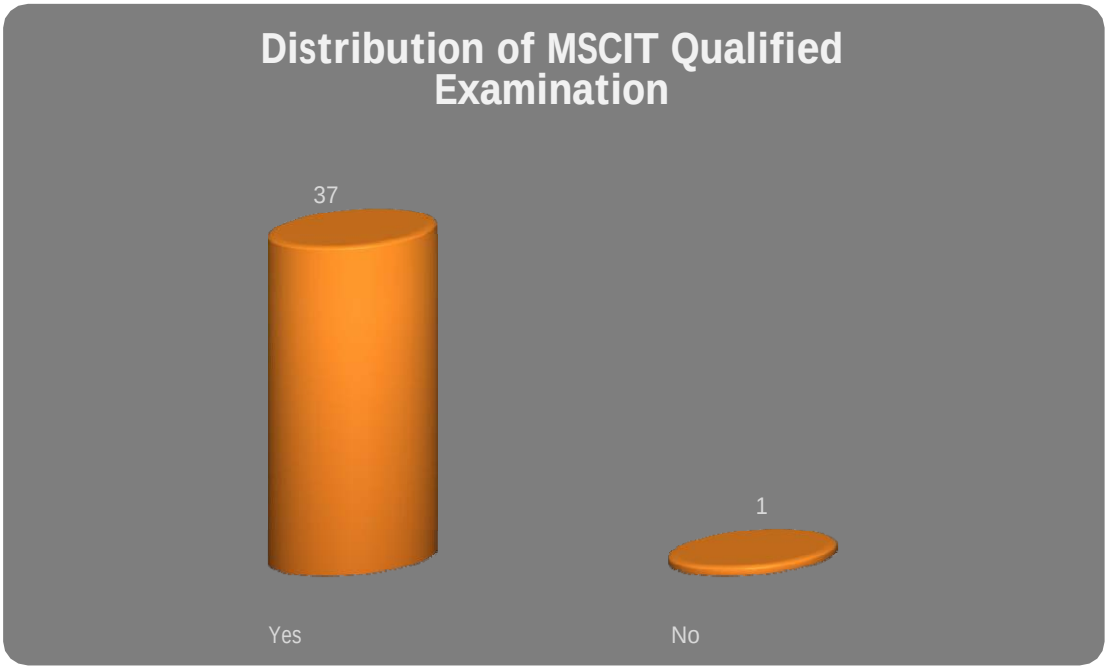

Figure 4.5 - Distribution of MSCIT Qualified ExaminationAdministrator.

From the above table and graph we can say that almost all except one staff all were MSC-IT certified and that's a great information since examination administrative staff has to work with ICT systems more its always an upper hand to be MSC-ITcertified.

6. ICT SystemsConfigurations

Available Computer Configuration	Frequency	Percentage (%)
Dell (windows 10, i3 processor)	05	13.16%
Dell (windows 10, i5 processor)	13	34.21%
Dell (windows 10, i7 processor)	20	52.63%
Total	**38**	**100.0%**

Table 4.21 - Types of ICT Facilities Used by Examination Administrator.

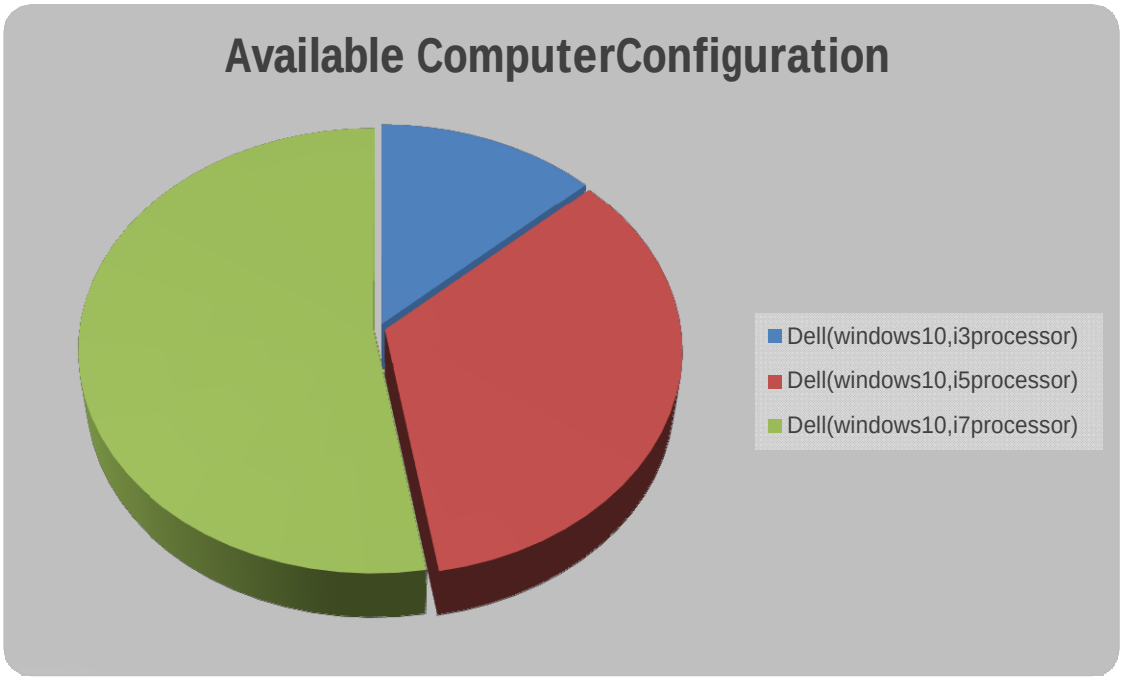

Figure 4.6 - Types of ICT Facilities Used by Examination Administrator.

From the above table and graph, it shows that the configuration available with the examination administrative staff is very latest one at least admitted by more than 50% of the staff. However, on the other hand still there is 13% staff is still using low configuration systems ofICT.

7. Internet SpeedAvailability

Available Internet Speed (10 MbPS)	Frequency	Percentage (%)
Yes	25	65.79%
No	13	34.21%
Total	38	100.0%

Table 4.22 - Available InternetSpeed

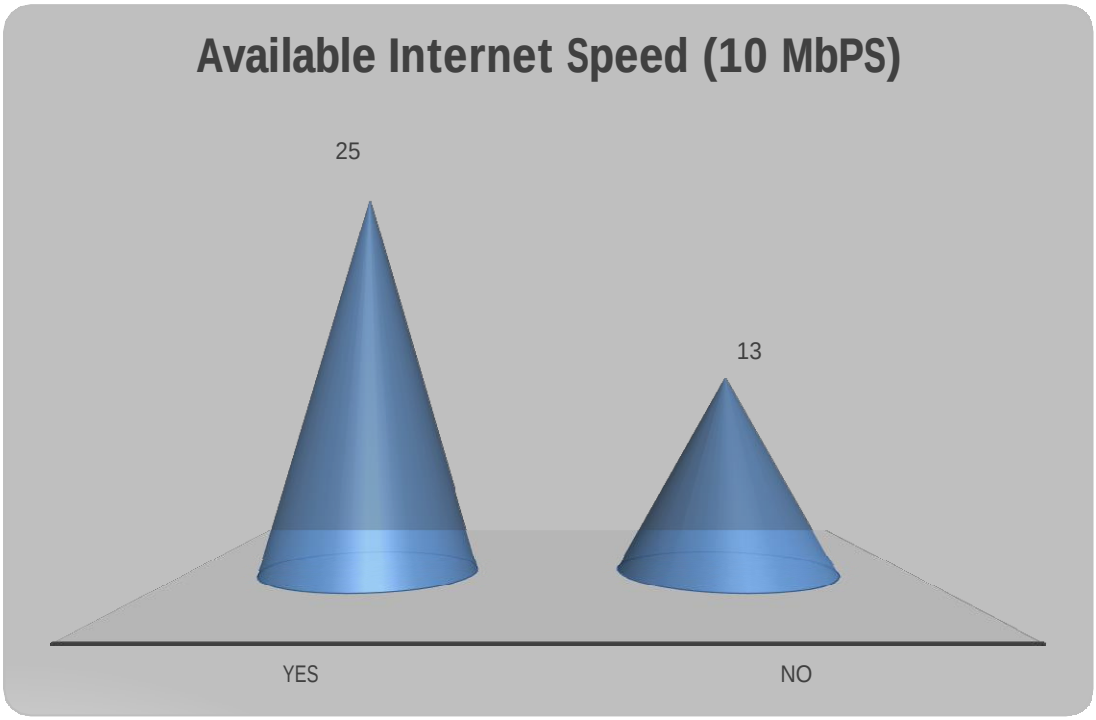

Figure 4.7 - Available InternetSpeed

The above table and graph suggests that almost 34% staff does not have high internet speed only 66% staff says that they do have 10mbps internet speed. This is a caution of speed in today times since system demands more bandwidth.

8. Help of ICT in Daily RoutineTasks

ICT Helps in Daily Work	Frequency	Percentage (%)
Always	34	89.5%
Usually	03	7.9%
Often	00	0.0%
Sometime	01	2.6%
Never	00	0.0%
Total	38	100.0%

Table 4.23 - ICT Helps in Dailywork.

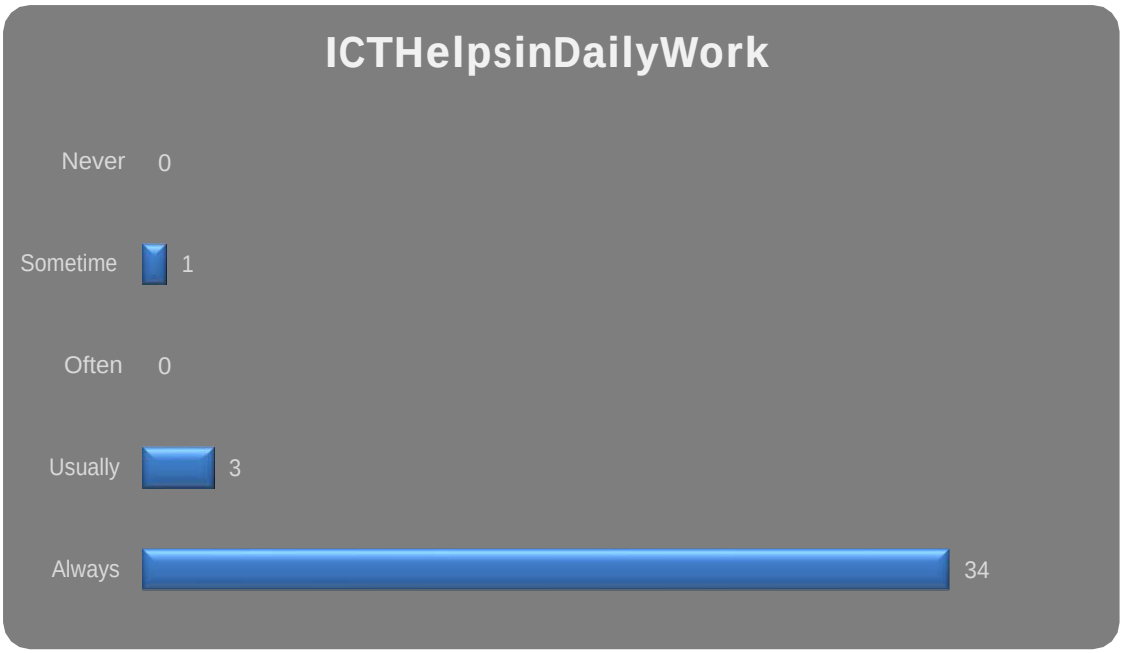

Figure 4.8 - ICT Helps in Dailywork.

The above graph and table shows that almost 90% staff uses ICT in their daily routine task; still there are the respondents from the staff around 3% who believes that they don't use it much only when needed that they use ICT systems.

9. Application of ICT used by Examination Administrator including Examination ManagementSystem

Sr. No.	Items	Yes	No	Total	Chi Square Statistic	P Value
1	ICT facilities (e.g. computers, internet and software) are used by Examination Section	38	0	38	38.0	0.001
2	Use of ICT has helped to reduce Examination Work	37	1	38	34.11	0.001
3	Use of ICT has helped to improve communication between Exam Section & Colleges	38	0	38	38.0	0.001
4	Use of ICT has reduced paper work in Examination Management System (EMS)	37	1	38	34.11	0.001
5	ICT has improved transparency and accountability in Examination work	38	0	38	38.0	0.001
6	Use of ICT has increased efficiency & effectiveness in Examination Management System (EMS) at University level	38	0	38	38.0	0.001
7	Adequate Internet facility is provided by the University to support Examination Management System (EMS)	38	0	38	38.0	0.001
8	Use of ICT helps to maintain accurate information	38	0	38	38.0	0.001
9	Use of ICT has helped in maintaining dissertation records online	38	0	38	38.0	0.001
10	Use of ICT facilitate for easy access of Old Batched Students' Data	38	0	38	38.0	0.001

Sr. No.	Items	Yes	No	Total	Chi Square Statistic	P Value
11	Backup of data is taken by you	29	9	38	10.53	0.001
12	Use of ICT has increased accuracy in conduct of Practical Examination	38	0	38	38.0	0.001
13	Use of ICT has helped in online declaration of dissertation results	36	2	38	30.42	0.001
14	Use of ICT has enhanced efficiency and accuracy in declaration of results	38	0	38	38.0	0.001
15	Online Teacher Database makes it easier to issue various appointments such as Centre Incharge / Centre Observer / IVS / CAP Custodian / Practical Examiners	38	0	38	38.0	0.001
16	Use of ICT has reduced loss of students' data and helps to maintain up-to-date students' data	37	1	38	34.11	0.001
17	Online declaration of result help to reduce enquiries of students and parents at University level	38	0	38	38.0	0.001
18	Participation of Exam Staff in Examination Management System (EMS) has increased due to ICT	37	1	38	34.11	0.001
19	Challenges are faced by Examination staff while use of ICT at University level	30	8	38	12.74	0.001
20	University allows you to participate in ICT workshop organized byNGO/Govt./College)	26	12	38	5.16	0.023

Sr. No.	Items	Yes	No	Total	Chi Square Statistic	P Value
21	Trained in Examination Management System for use of ICT	30	8	38	12.74	0.001

Table 4.24 - Application of ICT used by Examination Administrator including Examination Management System.

The above table show the hypothesis testing of statements related to usage of ICT in various aspect of examination system. The chi-square method has been adopted and the p-value for all the respective statements is less than 0.05 hence we can say that yes the staff has observed certain influence of ICT on managing examination systems at large.

10. Application of Examination Management Systems easier and user-friendly for Examination Administrator

Sr. No.	Items	Chi Square Statistic	P Value
1	Online updating of Teacher Database helps respective teachers to update their credentials from any place without any difficulty and without any correspondence as well as helps for making various appointments	66.47	0.001
2	Online Question Paper Setting System helps to set better question paper with minimum errors such as spelling errors, grammatical errors, stem construction of question, duplication of questions and options, etc.	66.47	0.001
3	Availability of Online Question Paper Sets helps to take review on generation of Question Paper Bank	71.21	0.001
4	Online publication of Time Table of University Examinations helps the students and the colleges to access it from any place	88.84	0.001
5	Online Publication of Theory Centres of University Examinations helps the students / colleges to view it from any place and it helps them to measure convenience of the Theory Centre	83.32	0.001
6	Online availability of Hall Tickets and Seat Summary eliminates postal delay and has increased efficiency in distribution process to the respective colleges	116.21	0.001

Sr. No.	Items	Chi Square Statistic	P Value
7	Online appointments of Centre Incharge / Centre Observer / IVS / CAP Custodian / Practical Examiners are issued on single click and it eliminates forwarding of physical copies as well as it is made available in their respective logins for their future reference.	88.84	0.001
8	Online issuance of Hall Tickets and various Appointments (Centre Incharge / Centre Observer / IVS / CAP Custodian / Practical Examiners) has reduced printing cost of the University	116.21	0.001
9	Online CCTV monitoring system facilitates to have access to keep watch on Examinees in the Examination Hall that helps to curb down malpractices at Theory Centre Level	63.32	0.001
10	Online submission of Dissertation by the student to the college has increased efficiency, accountability, transparency, printing and handling of multiple copies and it is eco-friendly system that has minimized printing cost of five copies	78.32	0.001
11	Online submission of Dissertation by the college to the University has increased efficiency, accountability and handling of multiple copies as compared to submission of five physical copies. It also saves space in office for retaining additional dissertation copies	78.32	0.001
12	Online forwarding of Dissertation copy for evaluation by the Subject Expert / Evaluator has eliminated postal delay and has increased efficiency of delivery, accountability, improvement in assessment quality as well as it facilitates submission of evaluation report on a single click	83.32	0.001
13	On receipt of online evaluation report of dissertation from the Evaluator, it helps to declare Dissertation result without any delay	63.58	0.001
14	Online Internal Assessment Marks Entries module has increased efficiency, accuracy and accountability in submission of Internal Assessment Marks by the College	78.32	0.001
15	Online Entries of Practical Examination Marks has increased efficiency in submission of Practical Marks and has eliminated manual errors of the Examiners	78.32	0.001

Sr. No.	Items	Chi Square Statistic	P Value
16	Online Entries of Theory Marks at Central Assessment Programme (CAP) has increased efficiency, monitoring, accountability as well as has eliminated manual errors of the examiners	78.32	0.001
17	Scanning of OMR Sheets / Markslips helps to convert manual marks entries into digital format that increases accuracy, efficiency and it is time saving and it curb down manual malpractices of changing marks	83.32	0.001
18	With the help of ICT, online submission of marks is adopted and as such it has helped to reduce malpractices of change in marks in Theory Examination, Practical Examination and Internal Assessment Examination from the system	101.47	0.001
19	Online declaration of University results helps the students and colleges to view the status of their results and academic term of the student can be started immediately without any loss of time	88.84	0.001
20	Online disbursement of advances of Theory, Practical and Central Assessment Programme (CAP) helps Colleges to instantly utilize the funds for smooth conduct of examination and it eliminates loss of Demand Draft in transit and postal delay	83.32	0.001
21	Optimum use of ICT has helped paperless work at College / University Level and has drastically brought down wastage of paper	94.89	0.001

Table 4.25 - Application of Examination Management Systems easier and user-friendly for Examination Administrator.

The above table shows hypothesis testing results of the statement involved into identifying theresponsesofexaminationadministratorsfortheusageofICTinmakingthesystemeasier and user-friendly. Since the p-value is less than 0.05 we can say that, the ICT does makes an easy way out of managing the complex examination system in more subtle way.

Hypothesis – 1: Whether there is any difference in the frequency of perceptions of exam administrative staff working in medical colleges regarding ICT has made examination management system easier and user-friendly?

Statistical Test: Friedman chi-square test

Hypothesis:

H0: There is no difference in the frequency of perceptions of exam administrative staff working in medical colleges regarding ICT has made examination management system easier anduser-friendly.

H1: There is a difference in the frequency of perceptions of exam administrative staff working in medical colleges regarding ICT has made examination management system easier anduser-friendly.

Level of Significance α = 0.05

Test Statistics	
N	38
Chi-Square	38.001
df	20
Asymp. Sig.	.009

Observation: $\chi 2$ (20) = 38.001, p-value=0.009

Conclusion: Since p-value (0.009) is less than level of Significance (0.05), alternate hypothesis is accepted hence it is concluded that there is difference in the frequency of perceptions of exam administrative staff working in medical colleges regarding ICT has made examination management system easier and user-friendly..

To find out whether difference lies we refer to Ranks table.

Statements	Mean Rank
Online updating of Teacher Database helps respective teachers to update their credentials from any place without any difficulty and without any correspondence as well as helps for making various appointments	10.00

Statements	Mean Rank
Online Question Paper Setting System helps to set better question paper with minimum errors such as spelling errors, grammatical errors, stem construction of question, duplication of questions and options, etc.	10.00
Availability of Online Question Paper Sets helps to take review on generation of Question Paper Bank	10.42
Online publication of Time Table of University Examinations helps the students and the colleges to access it from any place	11.36
Online Publication of Theory Centres of University Examinations helps the students / colleges to view it from any place and it helps them to measure convenience of the Theory Centre	11.08
Online availability of Hall Tickets and Seat Summary eliminates postal delay and has increased efficiency in distribution process to the respective colleges	12.46
Online appointments of Centre Incharge / Centre Observer / IVS / CAP Custodian / Practical Examiners are issued on single click and it eliminates forwarding of physical copies as well as it is made available in their respective logins for their future ref	11.36
Online issuance of Hall Tickets and various Appointments (Centre Incharge / Centre Observer / IVS / CAP Custodian / Practical Examiners) has reduced printing cost of the University	12.46
Online CCTV monitoring system facilitates to have access to keep watch on Examinees in the Examination Hall that helps to curb down malpractices at Theory Centre Level	9.88
Online submission of Dissertation by the student to the college has increased efficiency, accountability, transparency, printing and handling of multiple copies and it is eco-friendly system that has minimized printing cost of five copies	10.82
Online submission of Dissertation by the college to the University has increased efficiency, accountability and handling of multiple copies as compared to submission of five physical copies. It also saves space in office for retaining additional dissertation	10.82
Online forwarding of Dissertation copy for evaluation by the Subject Expert / Evaluator has eliminated postal delay and has increased efficiency of delivery, accountability, improvement in assessment quality as well as it facilitates submission of evaluation	11.08
On receipt of online evaluation report of dissertation from the Evaluator, it helps to declare Dissertation result without any delay	9.70

Statements	Mean Rank
Online Internal Assessment Marks Entries module has increased efficiency, accuracy and accountability in submission of Internal Assessment Marks by the College	10.82
Online Entries of Practical Examination Marks has increased efficiency in submission of Practical Marks and has eliminated manual errors of the Examiners	10.80
Online Entries of Theory Marks at Central Assessment Programme (CAP) has increased efficiency, monitoring, accountability as well as has eliminated manual errors of the examiners	10.82
Scanning of OMR Sheets / Markslips helps to convert manual marks entries into digital format that increases accuracy, efficiency and it is time saving and it curb down manual malpractices of changing marks	11.11
With the help of ICT, online submission of marks is adopted and as such it has helped to reduce malpractices of change in marks in Theory Examination, Practical Examination and Internal Assessment Examination from the system	11.91
Online declaration of University results helps the students and colleges to view the status of their results and academic term of the student can be started immediately without any loss of time	11.38
Online disbursement of advances of Theory, Practical and Central Assessment Programme (CAP) helps Colleges to instantly utilise the funds for smooth conduct of examination and it eliminates loss of Demand Draft in transit and postal delay	11.11
Optimum use of ICT has helped paperless work at College / University Level and has drastically brought down wastage of Paper	11.64

From Ranks table it can be seen that top 3 mean rank were online issuance of hall tickets and appointment of exam In Charge, avoiding exam malpractices such as change in marks and last but not least paperless work ofcolleges.

Hypothesis – 1: Whether there is any difference in the frequency of perceptions of exam administrative staff working in medical colleges regarding ICT has made examination management system easier and user-friendly?

- Statistical Test: Chi-squareTest

Hypothesis

- H0: There is no association between demographics and effectiveness of ICT in examinationsystem.
- H1: There is an association between demographics and effectiveness of ICT in examinationsystem.

Level of Significance α = 0.05

Gender (Demographics)	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.851	1	.050
Continuity Correction	.518	1	.472
Likelihood Ratio	3.220	1	.073
Fisher's Exact Test			
Linear-by-Linear Association	3.750	1	.053
N of Valid Cases	38		

Area (Demographics)	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.778	1	.009
Continuity Correction	1.220	1	.269
Likelihood Ratio	4.245	1	.039
Fisher's Exact Test			
Linear-by-Linear Association	6.600	1	.010
N of Valid Cases	38		

Since p-value is less than 0.05 we reject null hypothesis and accepts alternate hypothesis which suggests that there is an association between demographics and effectiveness of ICT in examination system. To identify the association, we will follow the below mentioned graph.

CHAPTER-5: CONCLUSIONS AND RECOMMENDATIONS

Conclusions

From the data analysis we can conclude that majority of the teachers working in different medical institutes are majority male.

Majority of the medical institutions are from ayurveda faculty followed by dental and allied medical institutions.

When it comes to the type of college we can conclude that almost 88% of these colleges are having private status and merely 7% are run by government. Majority of these medical colleges or institutions are located in urban areas.

Since this is dealing with ICT usage in examination system its quite important that faculty should have MSCIT qualification we can conclude that 32% of the teacher surveyed were not qualified on above mention certification.

All the colleges whose teachers have been surveyed said that ICT facility exist in their respective colleges.

From the teachers' responses we can conclude that around that around 96%-97% colleges are using ICT for college's affiliation and examination process but it's on lower side on managing financial work, student welfare activity and maintaining alumniconnect.

From the analysis we can conclude that around 10% population of the surveyed sample says that they don't use ICT to its full potential in managing examination related work.

We can conclude on a high note that ICT has helped in improving transparency accountability and efficiency and it has also helped in reducing paper work in examination managementsystem.

We can conclude that ICT has helped in major way in managing post examination work such as student's results managing the database of current as well as older batch students.

The finding leads to the conclusion that ICT has helped teacher community at large in maintaining student assessment marks as well as their assessment of dissertation.

We can conclude that major chunk of teachers agreed to the fact that they do have challenges in using ICT.

Finding leads to the conclusion of the aspects, it's takes about how colleges are trying their best to overcome the challenges of usingICT.

1. It was shocking to see that around 60% of the teachers say that college doesn't provide training to teaching staff for usingICT.
2. Again the dark side is 60% teachers say that they don't have technical staff for the assistance inICT.
3. And 80% teachers say that there is no workshop organized to address thisissue.

The interesting finding which conclude that in spite of above fact colleges allow them to participate in ICT related workshop organize by different agencies

The Findings of core examination management system leads to the conclusion that ICT has helped teacher to update their credential or their researches from any place without any difficulties.

Great use of ICT isthat it helps in setting question paper directly online with minimal errors on spelling or grammatical front and it has also help in removing duplication in questions.

We can conclude that ICT has seriously turndown the time required in creating and publishing and showing of timetables also it also helps in managing theory exam paper center in seamlessfashion.

We can conclude that now appointing center in-charge, centre observer, internal vigilance squad and practical examiner, issue of hall ticket is made simpler and paperless due to ICT.

ICT has achieved success in managing monitoring examination related task with greater accountability such as managing many assessment, assignment and disbursement and finally ICT has made sure that examination management system should become transparent accountable, efficient and effective with heavily cut down on paper based system.

When we analyzed the data for understanding the difference in the frequency of perception of teachers working in medical colleges regarding application of ICT we can conclude that there is less variation in the perception about application of ICT in alumniconnect work and there is high variation in the perception of ICT application in examination work as well as academic related activities.

When we analyzed the data for understanding the difference in the frequency of perception of teachers working in medical colleges regarding overcoming the challenges due to the implementation of ICT and we can conclude that there is variation exist at a very low level about the organization workshop of the colleges and higher variation in perception of providing training to the teaching staff.

It is concluded that from the findings of teacher's perceptions that ICT has made examination management system easier while updating the credential of teachers using ICT. Whereas it is also found that higher variation in perception of teachers is for declaring the students result online and accessing the examination time table online.

When we have analyzed the responses of examination administration staff working in MUHS we can conclude that variation does exist and ICT helps in online evaluation report of dissertation from the evaluator also it helps to declare dissertation result without any delayed.

Also the findings shows that variation of perception of examination administration staff working in MUHS is higher for online availability of hall ticket which eliminate delayed as well as for the appointments of center in-charge, center observer, internal vigilance squad and practical examiner.

When the data has been analyzed for demographic and the effectiveness of ICT in examination management system we conclude that there exist association between gender and area are associated with effectiveness of ICT in examination management system. Male gender has more strongly shows effectiveness rather than female gender whereas urban areas come out strongly associated with effectiveness of ICT in examination management system rather than rural areas.

Recommendations

Researcher has certain suggestion for the colleges which are mentioned below:

1. Colleges should focus on increasing female participation into the teaching as well as examination administration jobs since female representation is very low.
2. Since lot of colleges are still running on low configuration of ICT system, colleges should focus on improving these latest or high performing system there is disparity in availability of speed of internet between urban verses rural and hence the colleges particularly into the rural areas must upgrade their internet connectionspeed.
3. From the evidences found, colleges should focus on processing appropriate financial management software as well as strengthening evaluation and monitoring system of examination.
4. It is important for any colleges to flourish and it can only happen when it has a strong alumni network for knowledge sharing and hence colleges should focus more in utilizing ICT to its optimum potential to maintain and connect with all the respectivealumni.
5. There is difference between teachers perception and examination administration staff about the user friendliness of ICT in examination management system where teachers believe that somehow colleges found it difficult to view the status of result whereas examination administration staff sees that somehow ICT is not performing at its full potential in managing examination related task such as availability of hall ticket are its summery by respective colleges since ICT takes time in performing online operation which also impact issuing of hall ticket and various appointment of center in-charge, center observer, internal vigilance squad and practical examiner hence colleges should focus on upgrading ICT infrastructure and streamlining the processes involved into examination management system more specifically from teachers perspective on assessment evaluation while from exam administrative staff point of view improvising pre and post examination management system.

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ANNEXURES

"ANALYTICAL STUDY OF APPLICATION OF INFORMATION COMMUNICATION TECHNOLOGY (ICT) IN THE MANAGEMENT OF EXAMINATION SYSTEM"

PROFORMA (TEACHING)

PART – A

PERSONAL INFORMATION

1. Name of Teacher:.....

2.Sex: Male/Female ☐ ☐

3. Age : …….. yrs.

4. Post Held / Designation: .....

5. Name of College : .....

6. Type of College:Aided/Govt./Private ☐ ☐ ☐

7. District : .....

8. Residential Area : Urban/Rural ☐ ☐

9.Educational Qualification : .....

10. MSCIT Qualified : Yes ☐ No ☐

11. Contact Address : .....

12. Email ID : .....

13. Mobile No.: .....

PART – B

Research Questionnaire for Teaching Staff

The Role/Application of ICT currently being used by your College including Examination Management System.

1. Whether ICT facilities (e.g. computers, internet and software) are used by your college?

   a. Yes b. No

2. If yes, kindly mention type of ICT facilities used in your college :

	Yes	No
a. Computer :	☐	☐
b. Internet :	☐	☐
c. Software:	☐	☐

   d. Other : (Please specify) .....

3. Availability of configuration of ICT :

   a. Computer (Latest Version) : .....

   b. Internet (with minimum 10 MbPs Speed) : .....

   c. Software (Tally) : .....

   d. Other (If Any) :.....

4. In which areas use of ICT is applied?

   a. College Affiliation ☐

   b. Examination Work ☐

   c. Financial Work ☐

   d. Student Welfare Activity ☐

   e. Academic related activity ☐

   f. Alumni ☐

5. How frequently ICT helps in your exam related work?

1) Always ☐
2) Usually ☐
3) Often ☐
4) Sometime ☐
5) Never ☐

6. Whether use of ICT has improved efficiency between University & College?

a. Yes b. No

7. Whether use of ICT has reduced paper work in Examination Management System?

a. Yes b. No

8. Whether ICT has improved transparency and accountability in college activities?

a. Yes b. No

9. Whether use of ICT has increased efficiency & effectiveness in EMSat your college level?

a. Yes b. No

10. Whether Internet facility used by your college to support Examination Management System (EMS) is adequate?

a. Yes b. No

11. Whether ICT has enhanced efficiency in tracking student's results?

a. Yes b. No

12. Whether use of ICT facilitates for easy access of old batches students?

a. Yes b. No

13. Whether backup of data is taken by the college?

a. Yes b. No

If Yes, how frequently (in days) : .....

14. Whether use of ICT has made easier for the college to verify students 'fees status as well as their Internal Assessment Marks?

a. Yes b. No

15. Whether use of ICT has helped your college to update Teachers Database?

b. Yes b. No

16. Whether use of ICT helps to maintain accurate information?

a. Yes b. No

17. Whether use of ICT reduces loss of students' data and helps to maintain up-to-date students' data?

a. Yes b. No

18. Whether online declaration of results helps to reduce enquiries of students and parents at college level?

a. Yes b. No

19. Whether use of ICT has increased participation of teachers in EMS at college level?

a. Yes b. No

20. Whether challenges are faced by your college staff while use of ICT at college level?

a. Yes b. No

If Yes, please specify.....

21. If Yes, how your college overcomes challenges for it?

a. Provide Training to Teaching / Administrative Staff
b. Technical Staff Assistance
c. To organise Workshop
d. By Self-study
e. Improve IT Infrastructure

22. Whether college allow you to participate in ICT workshop organized by NGO/Govt./Colleges)?

a. Yes b. No

23. How many staff of your college is trained in ICT.

No. of Teaching Staff :- .....

No. of Non-teaching Staff :- .....

PART – C

Research Questionnaire for Teaching Staff

Tick mark (√) the most appropriate response to the following questions as follows :-

1. Strongly Disagree (SD)2. Disagree (DA)3. Uncertain (U) 4. Agree (A) 5. Strongly Agree (SA)

Sr. No.	Whether Use of ICT has made various Online Application of Examination Management Systems easier and user-friendly	SD	D	U	A	SA
1.	Online updating of Teacher Database helps respective teachers to update their credentials from any place without any difficulty and without any correspondence					
2.	Online Question Paper Setting System helps to set better question paper with minimum errors such as spelling errors, grammatical errors, stem construction of question, duplication of questions and options, etc.					
3.	Online publication of Time Table of University Examinations helps the students and the colleges to access it from any place					
4.	Online Publication of Theory Centres of University Examinations helps the students / colleges to view it from any place and it helps them to measure convenience of the Theory Centre					
5.	Online availability of Hall Tickets and Seat Summary eliminates postal delay and has increased efficiency in distribution process to the respective students					
6.	Online issuance of appointments of Centre In charge / Centre Observer / IVS / CAP Custodian / Practical Examiners helps to their appointment from any place without carrying physical copy of appointment with quick and easy access in their logins					
7.	Online issuance of Hall Tickets and various Appointments (Centre Incharge / Centre Observer / IVS / CAP Custodian / Practical Examiners) has reduced printing cost of the University					
8.	Online CCTV monitoring system facilitates to have access to keep watch on Examinees in the Examination Hall that helps to curb down malpractices at Theory Centre Level					

Sr. No.	Whether Use of ICT has made various Online Application of Examination Management Systems easier and user-friendly	SD	D	U	A	SA
9.	Online submission of Dissertation by the student to the college has increased efficiency, accountability, transparency, printing and handling of multiple copies and it is eco-friendly system that has minimised printing cost of five copies					
10.	Online submission of Dissertation by the college to the University has increased efficiency, accountability and handling of multiple copies as compared to submission of five physical copies					
11.	Online forwarding of Dissertation copy for evaluation by the Subject Expert / Evaluator has eliminated postal delay and has increased efficiency of delivery, accountability, improvement in assessment quality as well as it facilitates submission of evaluation report on a single click					
12.	Online Internal Assessment Marks Entries module has increased efficiency, accuracy and accountability in submission of Internal Assessment Marks by the College					
13.	Online Entries of Practical Examination Marks has increased efficiency in submission of Practical Marks and has eliminated manual errors of the Examiners					
14.	Online Entries of Theory Marks at Central Assessment Programme (CAP) has increased efficiency, accountability as well as has eliminated manual errors of the examiners					
15.	With the help of ICT online submission of marks is adopted and as such it has helped to reduce malpractices of change in marks in Theory Examination, Practical Examination and Internal Assessment Examination from the system					
16.	Online Declaration of University Results helps the students and colleges to view the status of their results					
17.	Online disbursement of advances of Theory, Practical and Central Assessment Programme (CAP) helps Colleges to instantly utilise the funds for smooth conduct of examination and it eliminates loss of Demand Draft in transit and postal delay					
18.	Optimum use of ICT has helped paperless work at College / University Level and has drastically brought down wastage of paper					

PART – D
CONSENT FORM

I Mr./ Mrs. / Dr. ..... whose particulars are mentioned above have been explained and fully understood the various aspects of the study entitled.

"ANALYTICAL STUDY OF APPLICATION OF INFORMATION COMMUNICATION TECHNOLOGY (ICT) IN THE MANAGEMENT OF EXAMINATION SYSTEM" In the language I understood and I hereby voluntarily consent to participate in the above study.

1. I have received and explanation of the nature and purpose of the study and what I will be expected to do.
2. I understand that my participation in the study is voluntary and that I may refuse to participate or any withdraw from the study anytime, without any explanation.
3. I understand that my identity will not be revealed in any publication.
4. I agree to take part in the above study.

Name of Teacher : .....

Signature : .....

Place :

"ANALYTICAL STUDY OF APPLICATION OF INFORMATION COMMUNICATION TECHNOLOGY (ICT) IN THE MANAGEMENT OF EXAMINATION SYSTEM"

PROFORMA (EXAMINATION)

PART – A
PERSONAL INFORMATION

1. Name of University Staff: .....

2. Sex: Male ☐ / Female ☐

3. Age:.....years

4. Post Held / Designation:.....

5. Name of Department:.....

6. Residential Area: Urban ☐ Rural ☐

7. District: .....

9. Educational Qualification: .....

10. MSCIT Qualified: Yes ☐ No ☐

11. Contact Address:.....

12. Email ID:.....

13. Mobile No.: .....

PART – B

Research Questionnaire for Examination Administrator

The Role / Application of ICT currently being used by you including Examination Management System.

1. Whether ICT facilities (e.g. computers, internet and software) are used by Examination Section?

   b. Yes b. No

2. If yes, kindly mention type of ICT facilities used in your college :

	Yes	No
e. Computer:	☐	☐
f. Internet:	☐	☐
g. Software:	☐	☐

   h. Other, If any (Please specify).....

3. Availability of configuration of ICT :

   e. Computer (Latest Version) : .....
   f. Internet (with minimum 10 MbPs Speed) : .....
   g. Softwares : .....
   h. Other (If Any) :.....

4. How frequently ICT helps in your daily work?

   6) Always ☐
   7) Usually ☐
   8) Often ☐
   9) Sometime ☐
   10) Never ☐

5. Whether use of ICT has helped to reduce Examination Work?

   b. Yes b. No

6. Whether use of ICT has helped to improve communication between Exam Section& Colleges?

a. Yes b. No

7. Whether use of ICT has reduced paper work in Examination Management System (EMS)?

b. Yes b. No

8. Whether ICT has improved transparency and accountability in Examination work?

a. Yes b. No

9. Whether use of ICT has increased efficiency & effectiveness in Examination Management System (EMS) at University level?

b. Yes b. No

10. Whether adequate Internet facility is provided by theUniversity to support Examination Management System (EMS)?

a. Yes b. No

11. Whether use of ICT helps to maintain accurate information?

b. Yes b. No

12. Whether use of ICT has helped in maintaining dissertation recordsonline?

a. Yes b. No

13. Whether use of ICT facilitate for easy access of Old Batched Students' Data?

a. Yes b. No

14. Whether backup of data is taken by you?

b. Yes b. No

If Yes, how frequently (in days) : .....

15. Whether use of ICT has increased accuracy in conduct of Practical Examination?

a. Yes b. No

16. Whether use of ICT has helped in online declaration of dissertation results?

a. Yes b. No

17. Whether use of ICT has enhanced efficiency and accuracy in declaration of results?

b. Yes b. No

18. Whether Online Teacher Database makes it easier to issue various appointments such as Centre Incharge / Centre Observer /IVS/CAP Custodian/ Practical Examiners?

c. Yes b. No

19. Whether use of ICT has reduced loss of students' data and helps to maintain up-to-date students' data?

a. Yes b. No

20. Whether online declaration of result help to reduce enquiries of students and parents at University level?

b. Yes b. No

21. Whether participation of Exam Staff in Examination Management System(EMS) has increased due to ICT?

a. Yes b. No

22. Whether challenges are faced by Examination staff while use of ICT at University level?

b. Yes b. No

If Yes, please specify .....

23. If yes, how Exam Section/University overcomes challenges of ICT in implement.

f. Providing Training to Examination Staff

g. Technical Staff Assistance

h. To organise Workshop

i. By Self-study

24. Whether University allows you to participate in ICT workshop organized by NGO/Govt./College)?

b. Yes b. No

25. Whether you are trained in Examination Management System for use of ICT?

a. Yes b. No

PART – C
Research Questionnaire for Examination Administrator

Tick mark (√) the most appropriate response to the following questions as follows :-

1. Strongly Disagree (SD) 2. Disagree (DA) 3. Uncertain (U) 4. Agree (A) 5. Strongly Agree (SA)

Sr. No.	Whether Use of ICT has made various Online Application of Examination Management Systems easier and user-friendly	SD	D	U	A	SA
1.	Online updating of Teacher Database helps respective teachers to update their credentials from any place without any difficulty and without any correspondence as well as helps for making various appointments					
2.	Online Question Paper Setting System helps to set better question paper with minimum errors such as spelling errors, grammatical errors, stem construction of question, duplication of questions and options, etc.					
3.	Availability of Online Question Paper Sets helps to take review on generation of Question Paper Bank					
4.	Online publication of Time Table of University Examinations helps the students and the colleges to access it from any place					
5.	Online Publication of Theory Centres of University Examinations helps the students / colleges to view it from any place and it helps them to measure convenience of the Theory Centre					
6.	Online availability of Hall Tickets and Seat Summary eliminates postal delay and has increased efficiency in distribution process to the respective colleges					
7.	Online appointments of Centre Incharge / Centre Observer / IVS / CAP Custodian / Practical Examiners are issued on single click and it eliminates forwarding of physical copies as well as it is made available in their respective logins for their future reference.					
8.	Online issuance of Hall Tickets and various Appointments (Centre Incharge / Centre Observer / IVS / CAP Custodian / Practical Examiners) has reduced printing cost of the University					

Sr. No.	Whether Use of ICT has made various Online Application of Examination Management Systems easier and user-friendly	SD	D	U	A	SA
9.	Online CCTV monitoring system facilitates to have access to keep watch on Examinees in the Examination Hall that helps to curb down malpractices at Theory Centre Level					
10.	Online submission of Dissertation by the student to the college has increased efficiency, accountability, transparency, printing and handling of multiple copies and it is eco-friendly system that has minimised printing cost of five copies					
11.	Online submission of Dissertation by the college to the University has increased efficiency, accountability and handling of multiple copies as compared to submission of five physical copies. It also saves space in office for retaining additional dissertation copies					
12.	Online forwarding of Dissertation copy for evaluation by the Subject Expert / Evaluator has eliminated postal delay and has increased efficiency of delivery, accountability, improvement in assessment quality as well as it facilitates submission of evaluation report on a single click					
13.	On receipt of online evaluation report of dissertation from the Evaluator, it helps to declare Dissertation result without any delay					
14.	Online Internal Assessment Marks Entries module has increased efficiency, accuracy and accountability in submission of Internal Assessment Marks by the College					
15.	OnlineEntries of Practical Examination Marks has increased efficiency in submission of Practical Marks and has eliminated manual errors of the Examiners					
16.	Online Entries of Theory Marks at Central Assessment Programme (CAP) has increased efficiency, monitoring, accountability as well as has eliminated manual errors of the examiners					
17.	Scanning of OMR Sheets / Markslips helps to convert manual marks entries into digital format that increases accuracy, efficiency and it is time saving and it curb down manual malpractices of changing marks					