CHAPTER 1
INTRODUCTION

1.1 Higher Education

Higher education is important because it produces knowledge that advances understanding of the natural and social worlds and enriches the accumulated scientific and cultural wealth of humanity. The higher education spreads the knowledge and imposes the development and cultivation of the students ' cognitive character. Higher education can offer numerous benefits, including a good career and financial stability. Higher education plays an essential part in other areas of life in the 21st century. Achieving higher education can create more opportunities and boost the overall quality of life. Today, people see the benefit of higher education and its role in creating better job prospects and a more comfortable lifestyle.

Higher education not only prepares students in their chosen area, but also helps them to grasp complicated topics, to think critically, and to share their ideas efficiently. Students also learn essential skills, such as teamwork, self-discipline, and how to see a job from start to end. Higher education enables them to become more professional and offers a lot of work-related skills. It develops confidence, and self-esteem is boosted after the completion of higher education. Not only the people become well equipped to deal with life’s mental challenges but are more likely to be satisfied. Higher education has long been thought of as a rite of passage, and, therefore, once the person crossed that finish line, have that extra sense of accomplishment (Vista, 2019).

Among the most vital benefits of higher education in the 21st century is the fact that it helps communities and societies operate smoothly and enhances personal lives. Educated individuals are involved more actively in societal activities like political interest, voting, interpersonal trust, and volunteering, according to the Organization for Economic Cooperation and Development (OECD). When one has more knowledge, they are more inclined to participate in these events and activities (Vista, 2019).

Higher education makes people more conscious of what they are efficient of as well. This facilitates them to develop their own life, as well as contribute to the world as a whole. When they spend one, two, four, or six years of learning and developing

themselves, they tend to perceive better and happier as to lead an educated life. Higher education offers an opportunity for people to focus on humanity's critical, physical, economic, legal, moral, and spiritual problems. Being at the top of the pyramid, higher education also plays a crucial role in developing teachers for the education system.

1.2 Higher Education in India

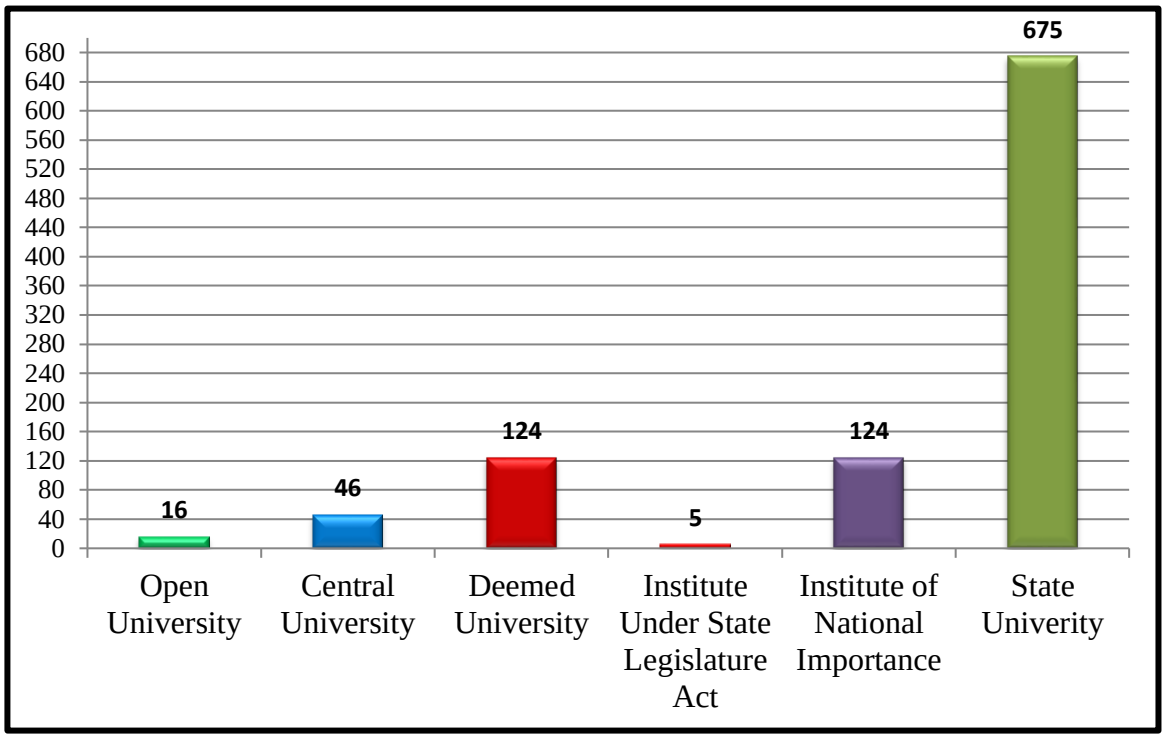
Higher education plays an important role in the growth of a nation as it is seen as an effective means of creating a knowledge-based society. India's higher education system is the world's third-largest in terms of students, next to China and the United States (Sheikh, 2017). India's higher education sector observed an enormous increase in the number of universities, institutions, and colleges since independence (Sheikh 2017).

The Government of India has taken a range of steps to increase access to higher education by implementing state-specific policies, enhancing the importance of higher education through curriculum changes, vocational programmes, and networking, adoption of information technology and distance learning with reforms in governance. (Snehi, 2009).

India has been always a land of scholars and learners. Since independence Indian has progressed significantly in terms of higher education statistics. The central government and state government are trying to encourage talent by concentrating on the number of universities and colleges to increase higher education in India. University Grant Commission is the main governing body that imposes its standards, advises the governing body, and helps coordinate between center and state (Sheikh 2017).

According to the All India Survey on Indian Higher Education (2019), there are a total of 993 Universities, 39931 colleges, and 10725 Stand Alone Institutions. The top States in terms of highest number of colleges in India are Uttar Pradesh, Maharashtra, Karnataka, Rajasthan, Haryana, Tamil Nadu, Gujarat and Madhypradesh. The universities are classified into various categories as presented in below figure.

Figure 1: Total number of Universities according to their classification



(Source: All India Survey on Higher Education, 2019)

According to the All India Survey on Higher Education (2019), the total enrolment in higher education has been estimated to be 37.4 million with 19.2 million boys and 18.2 million girls. Girls constitute 48.6% of the total enrolment. Gross Enrolment Ratio (GER) in Higher education in India is 26.3%, which is calculated for 18-23 years of age group. GER for the male population is 26.3% and for females, it is 26.4%. For Scheduled Castes, it is 23% and for Scheduled Tribes, it is 17.2% as compared to the national GER of 26.3%. Distance enrolment constitutes about 10.62% of the total enrolment in higher education, of which 44.15% are female students. About 79.8% of the students are enrolled in the Undergraduate level programme. 1, 69,170 students are enrolled in a Ph.D. that is less than 0.5% of the total student enrolment. The estimated total number of teachers is 14, 16,299. Out of which more than half about 57.8% are male teachers and 42.2% are female teachers. At the all-India level, there are merely 73 female teachers per 100 male teachers. Pupil-Teacher Ratio (PTR) in Universities and Colleges is 29 if regular enrolment is considered.

Today, Knowledge is power. The more knowledge one has, the more empowered one is. However, India continues to face significant challenges. Despite rising investment in education, 25 percent of the population is still illiterate; only 15 percent of Indian

students attend high school, and just 7 percent graduate. The quality of education in India whether at primary or higher education is considerably poor as compared to major developing nations of the world (Sheikh, 2017). The possible reason behind this could be the issues and challenges faced by Indian higher education system.

1.3 Issues and Challenges in Higher Education

There are certain issues and challenges faced by the Indian higher education system. Various governments changed until today and all of them tried to boost the education system and implemented various education policies but those were not sufficient to solve the issues and challenges of higher education. UGC is constantly working and focusing on quality education in the higher education sector. Still, the Indian higher education system facing a lot of problems and challenges (Sheikh, 2017). Some of the challenges in the higher education system in India are discussed below:

- Enrolment: India's Higher Education Gross Enrolment Ratio (GER) is only 24.5% which is quite low as compared to both developed and other developing countries. With enrolments rising at the school level, the availability of higher education institutes is inadequate to meet the country's growing demand.
- Equity: In GER there is no equity among various sectors of society. The GER in Indian higher education among males and females differs to a greater extent. There are regional differences too; some states have high GER while some are far behind the national GER, suggesting major imbalances in the higher education system.
- Quality: Quality in higher education is a multi-dimensional, multilevel, and a dynamic concept. Ensuring higher education standards is one of the most critical problems facing India. The Government consistently focuses on quality education still, large numbers of colleges and universities in India are not able to meet the minimum standards set by the UGC and also unable to mark their place among the world's top universities.
- Infrastructure: A further hazard to the higher education system is inadequate infrastructure. Particularly government institutes suffer from poor physical facilities and infrastructure.
- Research and Innovation: In our country, there are very nominal scholars whose writings have been quoted by prominent Western writers. Research in higher

education institutes is inadequately focused. There are inadequate services and facilities for researchers, as well as small numbers of qualified faculty for research work. Most research scholars are either without fellowships or don't get their fellowships on time which has a direct or indirect effect on their studies. Besides, Indian higher education institutions have weak relations with research centers. So, this is another area of challenge to higher education in India.

- Faculty: Faculty shortages and the failure of the state educational system to recruit and retain well-qualified teachers have been challenging quality education for many years. The quality of teaching is also often poor and there are constraints faced in training the faculty (Kumar & Ambrish, 2015).

To overcome these issues and challenges several initiatives were taken by the different bodies and universities. To encourage research UGC has laid out schemes, awards, fellowships, under which financial assistance is provided to institutions of higher education as well as faculty members. Orientation and training programmes are conducted for teachers. Introduced the semester system, and regularly updating curricula and Choice Based Credit Systems (CBSC). The regulations on minimum qualifications for appointment of teachers and other academic staff in universities and colleges are also introduced. Accreditation of all universities is carried out regularly. Several initiatives are taken to impart education through information and communication technologies (ICTs).

1.4 Role and Importance of ICT in Higher Education

ICT can be an instrument in addressing some of the issues of higher education. Implementation of ICTs in higher education has profound implications for the entire educational process ranging from investment to use of technologies in dealing with key issues of access, equity, management, efficiency, pedagogy, quality, research, and innovation. ICT applications provide institutions with a competitive edge by providing enhanced services to students and faculty, achieving greater efficiencies and generating enriched learning experiences.

1.4.1 ICT in Teaching and Learning:

ICT can improve access and equality through online education. This can be achieved through networking institutions, virtual labs, database building, access to expert lectures and technical advances in industries and research organizations, etc. Teaching and learning can be further strengthened by replacing traditional teaching with creative approaches such as PowerPoint presentations and animations, modeling and simulations, video clips, and using Audio-Visual aids, LCD projectors, etc. ICT integration also helps to address the shortage of trained teachers. It offers opportunities for quality education, innovative learning approaches, and more educational experiences.

1.4.2 ICT in Administration:

ICT plays a significant role in the management of educational institutions by effective use of existing resources to simplify administrative functions (e.g. student administration, staff administration, general administration, etc.). Reduce paperwork and replace manual record-keeping with digital record keeping which helps to easily retrieve any information of students, staff, and general. ICT helps to complete the student monitoring and management aspects including admission, enrolment, payment of fees, evaluation, student p analyze student's performance and placement.

1.4.3 ICT in Research:

The integration of ICT in higher education enhances the quality of research work and more number of individuals enrolled in the research work in various fields. ICT facilitates links across the world in all subject matter and made social networking. It saves time, money, and effort to the researchers in their research studies. The collection and analysis of large data become easier through the availability of various software. The unprecedented growth in bandwidth and computing power provides opportunities to download a huge amount of data and can perform complex computations on them in a fast manner to get an accurate and reliability of data. (Alam, 2016)

ICT changes the concept of teacher-centered learning to student-centered learning and teachers act as coaches, mentors, and knowledge facilitators and the learning environment focuses on real-time problem-solving methods. Information technology changes the concept of traditional methods of research work and made the researchers

do more feasibility studies. With the evolution of ICT, researchers can complete their research work in a short period and motivates many upcoming researchers to handle more research work (Alam, 2016).

ICTs have the potential to drive innovative and effective ways of teaching-learning and research. The inclusion of learning tools, easier use of multimedia or simulation tools, easy and almost instant access to data and information in a digital form which allows for easy computations and data processing which were otherwise not feasible (Snehi, 2009). ICT promotes the generation of new business and job opportunities for a large number of population. This will generate the economy, reduces unemployment, and enhances the standard of living. ICT is a connecting agent as it connects the people across the world through various devices like a pager, faxes, mobiles, emails, and social networks. This enables the people to utilize the resources as and when needed with the changing environment and develops new trends in society (Alam, 2016).

Someone has rightly stated that learning should never stop even at the time of crisis. ICT, which a great enabler and facilitator of online learning, has kept the learning process intact in the period of COVID 19. Various Digital platforms and ICT initiatives are accessed by teachers, students, researchers, and corporate officials round the clock. These tools enable constant learning and offer several benefits such as flexibility, comfort, and interactive user interface. In this digital era, even when the students and faculties are having a barrier of social distancing, several industries are getting impacted including the education industry but ICT has reduced this barrier of social distancing and lockdown with the help of so many digital and online initiatives and tools. Students can be in constant touch with their faculties with the help of online classes conducted through Skype, Zoom, Google hangouts, Google classroom, etc (Gupta, 2020).

The use of technology in education is one of those methods that will help improve the quality of education in India. It is also altering the way education is provided in India. In COVID 19, the adoption of technology in education has led to an unprecedented transformation from teacher-centric education towards student-centric education. Virtual classrooms and various online tools are helping to continue and enhance the engagement between the teacher and students as close to the classroom-type experience. Going forward, smart classrooms are making everything possible from

teachers and parent meetings to staff/management meetings, providing the necessary interactivity. Technology-based education makes the education system more transparent and equal. Digital education needs balanced coordination between course content, educationists, technology, and course-takers and it can only be successfully implemented with the availability of basic amenities like internet connectivity, availability, and affordability of online systems, PCs, laptops, software, etc. Nonetheless, we can't deny the fact that here in such extreme situations; COVID-19 has only accelerated the adoption of technology to make quality education accessible to everyone (Dhanwan, 2020). Here the Digital India vision of the government is emerging as a vital instrument for solving the crisis due to Covid-19. The lockdown has accelerated the adoption of digital technology. This is an ideal time to experiment and deploy new tools to make education delivery meaningful to students who can't go to campuses. It's a chance to be more efficient and productive while developing new and improved professional skills/knowledge through online learning and assessment. Here, the role of teacher is important to execute and use ICT effectively in teaching-learning.

1.5 ICT and Higher Education Teachers

The success of every educational system depends on the quality of teachers, which, in turn, depends on the effective teaching/learning process. The role of teachers is important for development and bringing about necessary societal changes. Therefore, the quality of higher education depends on the quality of those who impart it. Teachers are essential components of every educational system. Teachers play important role in the overall advancement of the education system, as well as in imparting and sustaining higher education standards.

The rapid growth in Information and Communication Technologies (ICT) has brought extraordinary changes in recent years. ICT is becoming progressively more important in daily lives and educational systems. As the teacher plays an important role in the management of learning, teachers should equip themselves with ICT competencies to design new learning environments using the most modern technologies in the field of education (Qasem & Viswanathappa, 2016). Sugar, Crawely, and Fine (2004) indicate that technology adoption decisions are influenced by the teacher's perceptions and attitudes towards technology adoption. Furthermore, blended learning has become

extensive in education because of its suppleness for the teacher to integrate educational technology into teaching.

The emancipatory and transformative potential of ICT in higher education in India has helped to increase the country's demand for higher education through part-time and distance learning schemes. It can be used as a method to address the issues of cost, the lack of teachers, and poor quality of education as well as to resolve time and distance barriers (Pegu, 2014). Mooji (2007) states that differentiated ICT based education can be expected to provide greater reliability, validity, and efficiency of data collection and greater ease of analysis, evaluation, and interpretation at any educational level. While the world is moving rapidly towards digital media, the role of ICT in education has become increasingly important. It has transformed the way the knowledge is disseminated today in terms of how teachers interact and communicate with the students and vice-versa.

There is a change in teacher role due to the introduction of ICT in higher education. Years before the teachers were a knowledge transmitter, the primary source of information, content expert, and source of all answers to learning. Now the teacher works more as a facilitator, collaborator, coach, mentor, knowledge navigator, and co-learner. In a traditional method of teaching-learning a teacher controls and directs all aspects of learning, in ICT based education teachers gives students more options and responsibilities for their learning. There is a change in the teaching process also from personal or face to face learning in school/colleges, institutional training, and teacher-centered learning to students centered learning, learning from a distance through technology. There is a shift from the use of blackboard, chalks, information, educational, and communication material to the use of a computer, internet, and online teaching by the teachers. The traditional method of teaching-learning includes teacher-learner, hierarchical learning, and assimilation of existing knowledge whereas the new method includes collaborative learning, networked learning, and discovery of knowledge. Mahdi & Al-dera (2013) pointed out that Technology without teachers cannot create a good environment for teaching and learning. Teachers and technology have important roles to play in education. Together, good teachers and good technology are essential to provide educational improvement.

Depending on the shift in the teaching process and the role of the teachers, certain skills are needed by the teachers. A teacher's present role is reflected by the technical context they need to be able to use and manage effectively (computer, photocopier, PowerPoint, projector, etc.). Instead of teaching the chalk face, they need to be a specialist in information technology, a technician or/and a photocopy master. For the effective functioning of ICT in the educational system, teachers need to face the major challenges of re-thinking and re-engineering their roles and competencies from knowledge-generators to knowledge-facilitators.

An important step may call for a reassessment of the traditional role of teachers in India, where teachers are 'gurus', at the same time as divine agencies and beyond questioning. In addition to ethical/spiritual revamping of their roles, on a more realistic level, teachers should be competent enough to employ particular applications, comfortable with computers, confident to integrate ICT into current curricula, and also able to modify conventional educational theories and practices to enable futuristic demands of the changing global market that is complete information technology-oriented (Das, 2012).

The global pandemic coronavirus resulted in worldwide destruction. With educational institutions shut for almost two-five months, students have already lost half of the year to the catastrophic virus. Thus, the need of the hour is to ensure that a student's future is secure and learning is delivered seamlessly. It is thus, imperative that along with the education system, our teachers also undergo a facelift to adapt to the new world order. Due to the concept of social distancing gaining prominence, schools and educational institutes were forced to transition to virtual classrooms or other modes of online education in a matter of days. In the coming years, the importance of virtual education is going to grow two-fold. Virtual classrooms have in them the ability to take education to places where educational institutes cannot even reach, hence not only for normal education but also for disaster management and other functions – the reliance of virtual classrooms is just touted to grow in the coming years (Madlani, 2020). Today teachers need to be ready for conducting virtual classes and they need to develop their skills in conducting virtual classes. The teacher who is being intimidated by technology now has to take the bull by its horns. Those who are proficient at planning and teaching in the traditional classroom, planning for an online setting requires some re-learning.

Teacher technical mastery of ICT skills is not a sufficient precondition for the successful integration of ICTs in teaching. Teachers need comprehensive, continuous exposure to ICTs to be able to assess and choose the most suitable tools. However, the development of effective pedagogical methods is seen as more important than the technological mastery of ICT. Very few teachers typically have comprehensive knowledge of the wide range of ICT tools and resources. Teacher preparation and professional development is seen as a primary catalyst for the effective use of ICT in education. Traditional one-time teacher training sessions have not been seen as successful in encouraging teachers to use ICT. Effective ICT use in education increases teachers' training and professional development needs. However, ICTs can be a powerful tool to meet these increased needs, by offering access to more and better educational content. Help in routine administrative tasks, providing models and simulations of successful teaching methods, and allowing learning, both in face-to-face and distance learning settings. On-going and regular support is essential to support teacher professional development and can be facilitated through the use of ICTs (in the form of websites, discussion groups, e-mail communities, radio, or television broadcasts). Various initiatives have been made to help teachers and enhancing the quality of the teaching-learning process through ICT.

1.6 Initiatives for Integrating ICT in Higher Education

The use of ICT for the promotion of education and development has always been part of the education policy and strategy. The Government of India has initiated a variety of national as well as state-specific schemes that operate alongside a large number of privately led IT initiatives at school and higher education levels. In 1986 the draft on National policy on Education framed and modified in 1992 stressed upon employing Educational Technology to improve the quality of education (Das, 2012). According to National Education Policy 2020 an autonomous body, the National Educational Technology Forum (NETF), will be created to provide a platform for the free exchange of ideas on the use of technology to enhance learning, assessment, planning, administration, and so on, both for school and higher education. The revised policy also pointed out that the existing digital platforms and ongoing ICT-based educational initiatives must be optimized and expanded to meet the current and future challenges in providing quality education for all (Ministry of Human Resource Development, 2020).

In light of these, it is important to go through the efforts made by the government and UGC for the integration of ICT in higher education.

1.6.1 Government Efforts for Integrating ICT in Education

The following are a few initiatives made by the Indian government that clearly show the growing footprint of ICT in Higher Education.

- **The National Mission on Education through Information and Communication Technology** (NMEICT) is envisaged as a centrally funded scheme to harness the capacity of IT/ICT, in the teaching and learning process for the benefit of all the learners in Higher Education Institutions in any mode at any-time. Content generation and connectivity along with provision for access devices for institutions and learners are the major components of the mission. The National Mission on Education through ICT plans to generate new online course content for UG, PG, and Doctoral education. The National Mission on Education through ICT is working on a war foot to establish a virtual technical university to impart training to UG/PG students along with new teachers.
- **National Programme on Technology Enhanced Learning (NPTEL)**, a joint project of the IITs and IISc, offers E-learning through online Web and Video courses in Engineering, Science, and Humanities streams aiming to enhance the quality of Engineering education in the country by providing free online courseware.
- **The National Knowledge Network (NKN)** and **Connected Digital** has launched an initiative to cover 1,000 institutions besides providing digital campuses, video-conference classrooms, wireless hotspots, laptops/desktops to all students of professional/ science courses and Wi-Fi connectivity in hostels.
- **EPathshala** is a portal jointly initiated by the Ministry of Human Resource Development, Government of India and National Council of Educational Research and Training launched in November 2015. E-pathshala hosts educational resources for teachers, students, parents, researchers, and educators, which is available on the Web, Android, IOS, and Windows platforms. The resources are available in English, Hindi, and Urdu languages. Students can access all educational materials, including textbooks, audio, video, periodicals,

and a number of other printed and non-printed materials via ePathshala. These materials can be downloaded by the user for offline use with no limits on downloads. An MHRD, under its National Mission on Education through ICT (NME-ICT), has assigned work to the UGC for the development of e-content in 77 subjects at the postgraduate level. The content and its quality is the key component of the education system. High quality, curriculum-based, interactive content in different subjects across all disciplines of social sciences, arts, fine arts & humanities, natural & mathematical sciences, linguistics, and languages are being developed under this initiative named e-PG Pathshala.

- **SWAYAM** or Study Webs of Active –Learning for Young Aspiring Minds programme of Ministry of Human Resource Development, Government of India. Professors of centrally funded institutions like IITs, IIMs, central universities will offer online courses to citizens of India. SWAYAM is an instrument for self-actualization providing opportunities for life-long learning. Here learners can choose from hundreds of courses, virtually every course that is taught at the university/college/school level and these shall be offered by the best of the teachers in India and elsewhere. If a student is studying in any college, he/she can transfer the credits earned by taking these courses into their academic record. If you are, working or not working, in school, or out of school, SWAYAM presents a unique educational opportunity to expand the horizons of knowledge.
- Under the N-List program of INFLIBNET, being run under NMEICT, lakhs of e-books and thousands of high quality paid e-journals have been made available to colleges and universities to inculcate research culture in teachers and students. The model needs to be scaled up for maximizing the coverage and productive usage of the resources made available.
- The launch of EDUSAT brought satellite connectivity to large parts of rural India. Indira Gandhi National Open University (IGNOU) is leveraging satellite, television, and Internet technologies to offer online courses
- An increasing number of private players like Hughes Global Education, Manipal Education Group, Centum Learning, UEI Global, Shiv Nadar University, etc. are offering online education courses in association with leading Central and State Universities leveraging with good ICT infrastructure.

- Many Indian universities are contemplating Technology-enabled free access to educational resources. AICTE – Indian National Digital Library in Engineering & Technology (AICTE – INDEST) is a consortium set up by the Ministry of Human Resource to enhance greater access and generate annual savings in access to bibliographic databases. UGC has also launched its Digital Library Consortium to provide access to peer-reviewed journals and bibliographic databases covering subjects such as arts, humanities, technology, and sciences.

1.6.2 Efforts of UGC for integrating ICT in Higher education

- The UGC has implemented a scheme called "ICT for teaching and learning processes" to achieve quality and excellence in higher education. Network facilities with the assistance of ERNET, Ministry of Information and Technology, Government of India, have been set up at the UGC office to promote a safe working culture.
- UGC launched a mega programme namely, 'UGC INFONET', a network of Indian Universities and Colleges, by integrating Information and Communication Technology (ICT) in the process of teaching, learning, and education management. The network is operated by ERNET India and almost all the universities are part of the network.
- Information for Library Network (INFLIBNET), an autonomous Inter-University Centre of UGC is the nodal agency for organizing and facilitating the linkage between ERNET and Universities. Training programmes for the manpower were conducted to handle the ERNET facilities and other aspects of systems including electronic subscriptions.
- Besides, UGC is encouraging the creation of e-content/learning material for the teaching-learning method and management of education in colleges and universities. UGC is also partnering with organizations such as Intel by signing MOUs to successfully incorporate and enforce ICTs effectively in higher education institutions.
- The University Grants Commission also initiated several schemes, such as the setting up of Network Resource Centres in higher education institutes to motivate universities, colleges, and other learning institutes to promote better

incorporation of ICT in curricula to prepare the next generation of citizens for better adaptation in IT environments.

Beyond the efforts made by the government and UGC, there are various ICT resources that teachers can use in their teaching and research work. These ICT resources are successful in delivering lectures, preparing class notes, disseminating knowledge, and maintaining communication with students. The ICT tools powers researchers' access to information, enables new forms of communication and serves many on-line services related to research. Here are some ICT tools used for teaching-learning and research work.

1.7 ICT tools for Teaching

Education plays a important role in society, especially in our post-modern age. The recent growth of technology has caused a paradigm shift that has forced people to change the way they think, and it has changed the way they learn. So, teachers need to adjust their methods to reflect the times. Following are the tools which teacher can use for teaching and in their classroom.

- **Google Docs**: Teachers can share taught content to the students using Google Docs and students can collaborate on a shared project, or posting homework assignments to a class from the same.
- **Dropbox:** Dropbox has variety of features that can allow teachers to share specific folders with their students, and they can access them from their computers. There is also a mobile application that allows students to access and edit from their tablets or smartphones.
- **Educreations:** Some claim that the whiteboard as we knew it is dead, but it has been given a new life with Educreations. It gives the teacher the opportunities to build electronic whiteboards with lessons and tutorials that the teacher can share with his/her students. It's simple to make graphs, suggestions, animations, and other instructions, and the instructor can even capture audio for narrative purposes. A teacher can share it with his/her students – both in the classroom or via e-mail or social media.
- **TED Talk and YouTube:** TED Talk has a library of video lectures that cover a wide range of topics, and they can be used in the classroom to supplement what

the teacher is teaching. Youtube also provides a range of videos on different topics and the teacher can use it to supplement his/her teaching.

- **Google Hangouts:** Google has a suite of applications that are designed for teachers. Google Hangouts allows students to have video-based conversations from remote locations. It can be a great way to conduct online discussions and debates.
- **Google Classroom:** Classroom is a free service for schools, universities, non-profit organizations, and anyone with a personal Google account. The classroom makes it easy for learners and instructors to connect. Classroom makes it easy to create classes, distribute assignments, communicate, and stay organized.
- **Socrative:** Scoring is one of the toughest aspects of teaching, and Socrates is a perfect way to simplify the process. Not only does it help the teacher get a score, but it will also make it easier to submit reports and quizzes to their students.
- **Social media:** Social media networks provide teachers with opportunities to send information and notes to the students. The most highly valued use of such a network is sharing ideas. Spaces such as Twitter(https://twitter.com/), LinkedIn (https://in.linkedin.com/), Facebook (http://www.facebook.com/), and Google+ (https://plus.google.com/) offer instant opportunities to follow and learn from authors, educators, educational leaders, and professional heroes who not only share information and resources but frequently initiate and invite direct engagement.
- **Video Chats:** Video conferencing solutions such as Skype to connect with faraway experts or other classrooms for an online meeting via webcam, letting students share their experiences, and engage in distance learning. Google meet, Zoom, Microsoft Teams are other examples of video chats.
- **Edublogs:** Blogging has become an integral part of the culture of the Internet, and teachers should use it to their benefit. Edublogs is a WordPress-based blogging site developed with a teacher in mind. It can be helpful to create online documents (such as assignments and handouts) that teachers can share with their students, and it can even add photos.
- Presentation Software: Sometimes it's helpful to provide visual aids to complement teaching, stimulate discussion, or allow out-of-class teaching.

Tools designed for this purpose, such as PowerPoint, can be used well or used badly. Web tools to create presentations are Google presentation, Haiku Deck, Prezi, Zoho presentation.

1.8 ICT Tools for Research

Various ICT resources are available related to each research phase as follow:

1.8.1 Search for Data

Researchers need to ensure that they have access research databases that cover their subject matter. They can search for literature through free websites that provide links to academic papers, journals, published studies, and other scholarly sources. Some of them are as follows

- Jurn
- Google Scholar
- Academia.edu
- Springer
- Research gate
- iurn.org
- RefSeek
- ERIC
- Virtual Libraries

1.8.2 Save and Organize Data:

- **Mendeley:** With Mendeley, a researcher needs to download a PDF of the paper and move it to Mendeley. The software then annotates the title, writers, and other information, and also syncs the documents to the cloud and other devices, so that the individual will not lose their data if their computer breaks down. It also allows them to insert the citations in the correct format as they work on their literature review. Google Drive, Zotero, and EndNote do a similar job and also help in communicating and sharing with colleagues.

1.8.3 Data Collection: The internet can be used as a method of collecting data via direct email, web surveys, or other electronic instruments. There are various web portals that allow the researcher to design a questionnaire or upload it and collect data.

- Surveymonkey.com,
- Psychsurveys.com,
- Google forms

1.8.4 Data Analysis: Once the data are coded, they are ready for analysis. They can be coded online with help of the website which is used to collect data or if the data is collected manually it can be coded on MS Excel or Access. After coding the researcher must decide on the inferential statistics required and the programmes that he or she will use to analyze the data.

- http://www.statcrunch.com/
- http:/faculty.vassar.edu/lowry/into.html
- http://home.clara.net/sisa/index.htm

1.8.5 Gamer and Spelling Checker: Proper grammar is the secret to a great analysis of literature, so it is nice to have some resources at hand that can help to check or double-check meanings and definitions, as well as spelling and proper usage of terms. The following resources you may find useful:

- Dictionary.com
- Grammarly
- Thesaurus.com

1.8.6 Synthesis and Take Notes

- Evernote is a simple software application that helps in the task of storing ideas and accessing them later. Evernote makes sure all data is synchronized and accessible every day, and the basic option is free of charge. Other software are Educlipper, Scoop.it, Biblio, Diigo.
- OneNote is Microsoft's version of Evernote and similar to Evernote. It allows keeping all research material available in one place. Those accustomed and happy with other products associated with Microsoft's

Office Suite might find OneNote's user interface familiar. Google keep and Notability are also performing the same task.

1.8.7 Checking Plagiarism

- Unplag plagiarism checker is perfect for uncovering academic dishonesty since the device sees text similarities in student work. Educators can add papers to their profile library and search submitted works against the Internet or other files in the library. After testing, teachers can upload plagiarism reports or view the history of checks in the library. It is also possible to contact students and send them a plagiarism report.

1.8.8 Publication: Teachers can publish their research work through online publications. They can submit their manuscript to open access journals and can publish their work.

- Journal Finder – Elsevier's service that helps teacher to find journals that could be best suited for publishing their scientific article.
- Journal Guide – Find the best journal for their research. (blog post)
- Journal Reviewer – Aggregates information users provide about their experience with academic journals' review processes.
- Journalists – A service for academic authors run by academic authors for reviewing experiences with academic journals.
- RoMEO – Find out publisher copyright and self-archiving policies.
- SciRev – Share the teacher's experience with the scientific review process and learn from others to decide where to submit their manuscripts. (blog post).

Some of the ICT tools that a teacher and researcher can use in their teaching and research work are listed above. There are several more such ICT tools that they can use. Thus, the above discussion provides information on ICT for education and government efforts to incorporate ICT into Indian higher education. It is the role of the teacher to incorporate ICT tools in teaching-learning, and research as well as motivate students to use different ICT tools for learning. So it is a need to find out whether the teachers are playing their role or not and for this a systematic study needs to be conducted. There

are questions concerning to usage of ICT and its impact on higher education. So it needs an in-depth investigation. In light of the above discussion, the following questions need to be responded.

Q.1 Are the faculty members aware of the different ICT tools?

Q.2 How much ICT is used by them in education?

Q.3 Are they using ICT to an optimal level?

Q.4 What are the purposes of using ICT?

Q.5. How much they integrate ICT in their teaching, research, and administrative work?

Q.6 What is the influence of ICT on the professional work of the faculty members?

Q.7 Do they face any difficulty while using ICT? If yes; what are those difficulties?

Q.8 What are their suggestions for the improvement of ICT integration in education?

1.9 Statement of the Problem

Keeping in view the above discussion a study entitled "Information and Communication Technology in Higher Education" is decided to undertake.

1.10 Justification of the Study

ICTs have developed as powerful tools for the diffusion of knowledge and information. Their fast growth has already taken place all over the world; however, the integration of ICTs in education has deep effects for the whole education process ranging from investments to the use of technologies in dealing with key issues of access, equity, management, efficiency, pedagogy, quality, research, and innovation. The growing use of ICTs as an instructional medium is changing and will possibly continue to change many of the strategies employed by both educators and students in the teaching and learning process. (Mbodila, Jones & Muhandji 2013) It is obvious that by integrating ICT's in education, educators/teachers will develop strategies that will promote deep learning and change the learning environment into the learner-centered environment. As learning changes from a teacher-centered model to a learner-centered model, all

these strategies/techniques move the position of educator/ teacher more to that of facilitator and less to a single voice of authority in the classroom.

As we step into the 21st century, many factors bring strong strength to bear in the implementation of ICTs in education, and contemporary developments suggest that we will soon see large-scale shifts in the way education is designed and implemented as a result of ICT resources and opportunities. Information and Communication Technology has no doubt brought about tremendous change in education, but we are yet to achieve the desired level of IT adoption in higher education in the country. The optimal utilization of opportunities arising due to the diffusion of ICTs in the higher education system presents an enormous challenges. (Oliver 2002)

Nonetheless, it has become an indispensable support system for higher education as it could address some of the challenges facing the higher education system in the country. Moreover, it can provide access to education regardless of time and geographical barriers. Similarly wider availability of course material in education which can be shared using ICT can foster better teaching. While technology can influence the way how students are taught, it would also enable the development of collaborative skills as well as knowledge creation skills. ICT enabled education will ultimately lead to the democratization of education and it has the potential for transforming higher education in India. (Pegu 2014)

Referred reviewed literature on the ICT in higher education reveals that no investigation is conducted on the access, use, integration, and influence of ICT on academic performance among the faculty members of The Maharaja University of Baroda, Vadodara, Gujarat state. Hence the problem “Information and Communication Technology in Higher Education” is chosen for the present study. The present study will be carried out to understanding the perception of faculty members about the role of ICT in their lives. The study also intended to investigate the relationship between ICT use by faculty members and the level of academic activities. In sum, the present study will be carried out to examine the ICT use, its integration, influence on academic activities, and problems faced while using it among the faculty members. This study will benefit the educational administrators, teachers, parents, students, and social scientists in particular and the society in general. The increased dependence on computers, the internet, and Smartphone among university teachers and educational

workers is also considered as one of the factors for the need to do a study on this area. Further, the present study can also serve as a data bank for scholars and authorities of the various universities for further reference and also to design strategies and plans to develop the university libraries by the modem times whereby the faculty members, as well as the students /scholars, could become efficient in teaching as well as make their works more creative, productive and world standard ones.

1.11 Justification of the Sample

A teacher is a person who encourages others to gain information, skills, or values. Higher education (HE) teachers teach academic and vocational subjects to undergraduate and postgraduate students aged 18 or above. They serve in universities and other colleges of higher education. Teaching methods shall include lectures, workshops, tutorials, practical presentations, fieldwork, and e-learning. Multimedia tools are increasingly being used in education. Higher education lecturers often undertake their studies and contribute to the larger research efforts of their department or institution. The goal is to get this published in books or academic papers that will help to boost the profile of their employing HE institution. Administrative tasks take up a significant part of the working day. Many of the lecturers even carry on a pastoral role with their students. As HE lecturers advance through their career paths, they will be required to assume the management role of the relevant department.

Growing numbers of people accessing ICT, combined with the recent proliferation of information services on the Internet, can have significant implications for teaching, learning, and research. Teachers and students are increasingly dependent on ICT resources for their different educational purposes. The present survey is, therefore, an attempt to assess the effectiveness of ICT as an educational tool, and what role it plays in the educational system with special reference to The Maharaja Sayajirao University of Baroda, Vadodara. It is one of the oldest centers of learning in western India with 14 Faculties having 90 Departments, 3 constituent colleges, and several specialized centers and institutes' offering a wide spectrum of courses from kindergarten to Ph.D. It has more than 1200 well-qualified faculty members (www.msubaroda.ac.in). ICT is an inseparable part of today's universities' educational system. Use and awareness of ICT tools by faculty members and research scholars must be investigated so that the findings of such a study may be taken into consideration in the university plans for

effective and efficient use of the Internet for research work and simultaneous improvement of e-resources of its libraries. ICT usage by teachers is an important point for the NAAC accreditation as well for teachers' appraisal also in the universities. Therefore, it is necessary to study how much teachers are integrating ICT in their academic work as well as what problems are faced by them while integrating it in their academic activities.

The Maharaja Sayajirao University of Baroda invests a good deal of amount on providing this facility to both the teachers and students. It is, therefore, important to find out up to what extent they are utilizing this facility. It is necessary to conduct a study to determine whether ICT is used for academic activities. There was no significant study was found related to ICT usage by faculties of this university. Therefore it is decided to take faculties of The Maharaja Sayajirao University of Baroda, Vadodara as a sample of the present study.

1.12 Justification of the Study in the Department of Extension and Communication

Department of Extension and Communication at the Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara work on the various issues related to human development, education, impact of mass media on society, rural and urban development. In past years number of studies were undertaken related to the technology and its impact on the various groups of the society.

The students of the department learn about different technology and their usage for the development of the society under various courses. They are offered different ICT based courses such as computer application designing, media production, etc. Faculty members teach them all these courses and provide practical experiences wherever is possible. Despite this no study related to the usage of ICT by faculty members was carried out in the department. Conducting this study is more pertinent in the department of Extension and Communication as it will help in designing the course curriculum related to courses like media production, electronic media, computer application, etc.

Apart from this department also carried out action researches, training programmes, and workshops for different groups of society. Therefore, the present study will help in

the design of workshops, training programmes, etc. It will give guidelines to the students who want to conduct action researches related to ICT and higher education teachers. ICT in higher education is an emerging trend and they needs special attention. This topic can be taught meaningfully through researches and action projects in the department.

1.13 Justification of the Variables

Variables that may affect the ICT usage or its integration in teaching, research and extension work of the faculty members of The Maharaja Sayajirao University of Baroda, Vadodara.

a. Age:

The age of the faculty members may affect the use and integration of ICT by the faculty members. The younger teacher can be seen as ICT natives who have been more exposed to ICT. It can influence the uptake of ICT for teaching. Who are born in a digital world and digital immigrants will differ from those who have to learn the digital language and for whom ICT will always be a second language. Czaja and Chin (2007) Ageing influences the cognitive abilities that may restrict the adoption of new technologies. Age-related declines in cognition have significant consequences for access to technology. Declines in working memory can make it difficult for older people to learn new concepts or skills or to remember complex operating procedures (Cited in Chauhan, 2018). It would be important to know the use and the integration of ICT by the faculty members from various age groups.

Apart from ICT usage and its integration, problems faced by them in the use of ICT, and its influence on their professional work may also differ with their age. Young faculty members with more exposure to technology and with limited resources may face more problems as well as may found more influence on them. Hence, it would be interesting to know whether the problems faced by faculty members in the use of ICT and its influence on their work vary in relation to their age or not.

b. Designation

Teaching Assistant or Assistant Professors may less engage in administration work and more exposed to new technologies therefore their ICT usage, integration, and problems in usage may vary from the Associate Professors and Professors who are more engaged in administrative work and may get less time to integrate and use ICT in teaching and research. It would be interesting to explore the usage and integration of ICT by faculty members in their teaching, research, and administrative work in relation to their designation.

c. Discipline:

The application of ICT in teaching is more keeping with subject discipline than others, and that teachers have been reluctant to adopt a technology that appears incompatible with their subjects. Therefore, the subject also influences teachers' views of ICT integration in the classroom and their attitudes about ICT in education. In some subjects or domains, ICT is viewed as bringing new value to teaching and learning and as being beneficial and meaningful, in others, it is seen as being "just another tool" and in some subjects and domains ICT is perceived as a hindrance from teaching and learning basic skills in the subject (Barbara, Rosanda & Svjetlana, 2017). The teacher's subject domain may influence the use of ICT. The way ICT is used in lessons may be influenced by the teacher's knowledge about their subject and how ICT is related to it. The choice of technologies to help teaching and learning should be determined by their suitability, which may vary based on the needs of teachers, learners and subjects. Teachers has to consider carefully why, when, where, and how to put ICT in place; to analyze, what is proper ICT support in each subject domain. Teachers from technology and science can be more exposed to ICT and those from commerce, arts, and social sciences can be less exposed to ICT.

Science has been associated with emerging technologies for a long time, and that it has been one of the first subjects in which technology has been incorporated. Mathematics has been also applied to emerging technologies. Music and English subjects have weaker affiliation with new technologies. History teachers have been most hesitant to use technology and they also felt (like English teachers) that the humanistic aspect of their subject might be compromised by using ICT (Barbara,

Rosanda & Svjetlana, 2017). So it would be interesting to know whether the use and integration of ICT by faculty members vary in relation to discipline.

d. ICT Competency

The integration of ICT is dependent on the teachers' ICT competency or skills and ICT confidence. A very significant determinant of teacher's level of engagement in ICT is their level of confidence and skills in using the technologies. Teachers who have little or no skills in computers will try to avoid them. According to Peralta & Costa (2007), as cited in Buabeng-Andoh (2012) teachers with more experience with computers have greater confidence in their ability to use them effectively. Successful integration of ICT tools in academic activities largely depends on the competency of teachers in using modern technologies in teaching and learning. Peeraer & Petegem (2010) pointed out that better-skilled teachers tend to use more ICT tools and on a more regular basis than a teacher who perceives lower ICT skills. Lack of competence goes together with a lack of confidence and both factors are very significant determinants for the uptake of ICT in academic activities.

e. Opinions towards ICTs

To effectively initiate and integrate educational technology in university programs relies heavily on the teachers' support and opinion. It is known that if teachers see technology programs as neither meeting their needs nor their students' needs, they are unlikely to integrate the technology into their teaching and learning. Among the factors that affect the effective integration of ICT into teaching are teachers' opinions and beliefs towards technology (Buabeng-Andoh, 2012). One key area of teacher's opinions towards ICT is their understanding of how it will benefit their work and their students' learning. Favourable opinions towards ICT or constructive perspectives automatically lead to the uptake of ICT or innovative teaching practice. Unfavourable opinions towards ICT cannot motivate teachers to use ICT for academic activities. Successful integration of ICT depends largely on the right opinions of teachers towards the role of ICT in higher education. Hence, it would be interesting to know whether the use and integration of ICT by faculty members vary in relation to their opinions towards ICT.

f. Technological Infrastructure

Access to ICT infrastructure and resources in university is a critical prerequisite for the integration of ICT in education. Successful adoption and integration of ICT into university teaching depends mainly on the availability and accessibility of ICT tools such as hardware, software, etc. If teachers cannot access ICT resources, then they will not use them. Therefore, access to computers, updated software, and hardware are key elements to successful adoption and integration of technology (Buabeng-Andoh, 2012). Lack of computers, software, and other ICT tools can seriously limit what teachers can do in the classrooms with regards to the integration of ICT. Access to ICT is a first and necessary step in the integration process even though more access will not automatically lead to the use of ICT for teaching and learning. It is interesting to know, how technological infrastructure affects the use and integration of ICT by the faculty members.

1.14 Objectives of the Study

1. To study the profile of the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara.

2. To study the usage of ICT by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara.

3. To study the differences in the usage of ICT by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their
    a) Age
    b) Designation
    c) Discipline
    d) ICT competency
    e) Opinions towards ICTs
    f) Technological infrastructure

4. To study the differences in the usage of ICT by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their
    a) Integration of ICT
    b) Problems faced in the use of ICT

c) Influence of ICT

5. To study the integration of ICT by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara with respect to their
    a) Teaching
    b) Research
    c) Administrative Work

6. To study the differences in the integration of ICT in teaching by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their
    a) Age
    b) Designation
    c) Discipline
    d) ICT competency
    e) Opinion towards ICTs
    f) Technological Infrastructure

7. To study the differences in the integration of ICT in teaching by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their
    a) Usage of ICT
    b) Problems faced in the use of ICT
    c) Influence of ICT

8. To study the differences in the integration of ICT in research work by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their
    a) Age
    b) Designation
    c) Discipline
    d) ICT competency
    e) Opinion towards ICTs
    f) Technological Infrastructure

9. To study the differences in the integration of ICT in research work by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their
    a) Usage of ICT
    b) Problems faced in the use of ICT
    c) Influence of ICT
10. To study the differences in the integration of ICT in administrative work by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their
    a) Age
    b) Designation
    c) Discipline
    d) ICT competency
    e) Opinions towards ICTs
    f) Technological Infrastructure

11. To study the differences in the integration of ICT in administrative work by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their
    a) Usage of ICT
    b) Problems faced in the use of ICT
    c) Influence of ICT

12. To study the influence of ICT on the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara with respect to their
    a) Teaching
    b) Research
    c) Administrative Work

13. To study the differences in the influence of ICT on the teaching of the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their
    a) Age
    b) Designation
    c) Discipline

d) ICT competency
e) Opinion towards ICTs
f) Technological Infrastructure

14. To study the differences in the influence of ICT on the teaching of the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their
    a) Usage of ICT
    b) Integration of ICT
    c) Problems faced in the use of ICT

15. To study the differences in the influence of ICT on the research work of the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their
    a) Age
    b) Designation
    c) Discipline
    d) ICT competency
    e) Opinion towards ICTs
    f) Technological Infrastructure

16. To study the differences in the influence of ICT on research work of the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their
    a) Usage of ICT
    b) Integration of ICT
    c) Problems faced in the use of ICT

17. To study the differences in the influence of ICT on the administrative work of the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their
    a) Age
    b) Designation
    c) Discipline
    d) ICT competency

e) Opinion towards ICTs
f) Technological Infrastructure

18. To study the differences in the influence of ICT on the administrative work of the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their
    a) Usage of ICT
    b) Integration of ICT
    c) Problems faced in the use of ICT

19. To study the problems faced by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in using ICT with respect to
    a) Non-Human Resources
    b) Human Resources

20. To study the differences in the non- human resources related problems faced by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in the use of ICT in relation to their
    a) Age
    b) Designation
    c) Discipline
    d) ICT competency
    e) Opinions towards ICTs
    f) Technological infrastructure

21. To study the differences in the non-human resources related problems faced by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in the use of ICT in relation to their
    a) Usage of ICT
    b) Integration of ICT
    c) Influence of ICT

22. To study the differences in the human resources related problems faced by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in the use of ICT in relation to their

a) Age
b) Designation
c) Discipline
d) ICT competency
e) Opinions towards ICTs
f) Technological infrastructure

23. To study the differences in the human resources related problems faced by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in the use of ICT in relation to their
    a) Usage of ICT
    b) Integration of ICT
    c) Influence of ICT

24. To obtain the suggestions from the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara for improving the integration of ICT amongst the faculty members.

1.15 Null Hypotheses

1. There will be no significant differences in the usage of ICT tools by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their age, discipline, designation, competency in using ICT, opinions towards ICT, and technological infrastructure.

2. There will be no significant differences in the usage of ICT tools by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to the integration of ICT, problems faced in the use of ICT, and influence of ICT.

3. There will be no significant differences in the integration of ICT tools in teaching by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their age, discipline, designation, competency in using ICT, opinions towards ICT, and technological infrastructure.

4. There will be no significant differences in the integration of ICT tools in teaching by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to the usage of ICT, problems faced in the use of ICT, and influence of ICT.

5. There will be no significant differences in the integration of ICT tools in research work by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their age, discipline, designation, competency in using ICT, opinions towards ICT, and technological infrastructure.

6. There will be no significant differences in the integration of ICT tools in research work by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to the usage of ICT, problems faced in the use of ICT, and influence of ICT.

7. There will be no significant differences in the integration of ICT tools in the administrative work of the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their age, discipline, designation, competency in using ICT, opinions towards ICT, and technological infrastructure.

8. There will be no significant differences in the integration of ICT tools in the administrative work of the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to the usage of ICT, problems faced in the use of ICT, and influence of ICT.

9. There will be no significant differences in the influence of ICT on the teaching of the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their age, discipline, designation, competency in using ICT, opinions towards ICT, and technological infrastructure.

10. There will be no significant differences in the influence of ICT on the teaching of the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to the integration of ICT, problems faced in the use of ICT and usage of ICT.

11. There will be no significant differences in the influence of ICT on the research work of the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their age, discipline, designation, competency in using ICT, opinions towards ICT, and technological infrastructure.

12. There will be no significant differences in the influence of ICT on the research work of the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to the integration of ICT, problems faced in the use of ICT and usage of ICT.

13. There will be no significant differences in the influence of ICT on the administrative work of the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their age, discipline, designation, competency in using ICT, opinions towards ICT, and technological infrastructure.

14. There will be no significant differences in the influence of ICT on the administrative work of the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to the integration of ICT, problems faced in the use of ICT and usage of ICT.

15. There will be no significant differences in the non- human resources related problems faced by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their age, discipline, designation, competency in using ICT, opinions towards ICT and technological infrastructure.

16. There will be no significant differences in the non- human resources related problems faced by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to the integration of ICT, usage of ICT, and influence of ICT.

17. There will be no significant differences in the human resources related problems faced by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to their age, discipline, designation,

competency in using ICT, opinions towards ICT and technological infrastructure. variables.

18. There will be no significant differences in the human resources related problems faced by the faculty members of the Maharaja Sayajirao University of Baroda, Vadodara in relation to the integration of ICT, usage of ICT, and influence of ICT.

1.16 Assumptions

- The faculty members of The Maharaja Sayajirao University of Baroda, Vadodara are aware of ICT.
- The faculty members of The Maharaja Sayajirao University of Baroda, Vadodara are integrating ICT in teaching, research, and extension work.
- There is an influence of ICT on the academic performances of the faculty members of The Maharaja Sayajirao University of Baroda, Vadodara.
- The faculty members of The Maharaja Sayajirao University of Baroda, Vadodara are facing problems in using ICT in teaching, research, and extension work.

1.17 Delimitations

- The study is delimited to the faculty members of The Maharaja Sayajirao University of Baroda, Vadodara.
- The study is delimitated to the usage, integration, influence, problems faced in the usage of ICT in academic activities by the faculty members of The Maharaja Sayajirao University of Baroda, Vadodara.
- The study is delimited to the teaching, research work, and extension work of the faculty members of The Maharaja Sayajirao University of Baroda, Vadodara.

1.18 Operational Definition

- **ICT**: The term 'ICT' is used for computer and internet technology only for this study.
- **Integration:** The term 'Integration' refers to use of computer and internet based technologies and resources along with traditional media.