CHAPTER 5
SUMMARY

5.1 Introduction

5.1.1 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 offers numerous benefits including a prosperous career and financial security. In the 21st century, higher education plays significant role in other aspects of life. Achieving a higher education can increase opportunities and boost the overall quality of life. Today, people see the importance of university education and its role in providing better job opportunities and more comfortable lifestyle.

Higher education not only prepares students in their chosen area, but it also teaches them to grasp complicated topics, think critically, and to share their ideas effectively. Students also learn essential skills, such as organization, 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 of education also plays a crucial role in developing teachers for the education system.

5.1.2 Higher Education in India

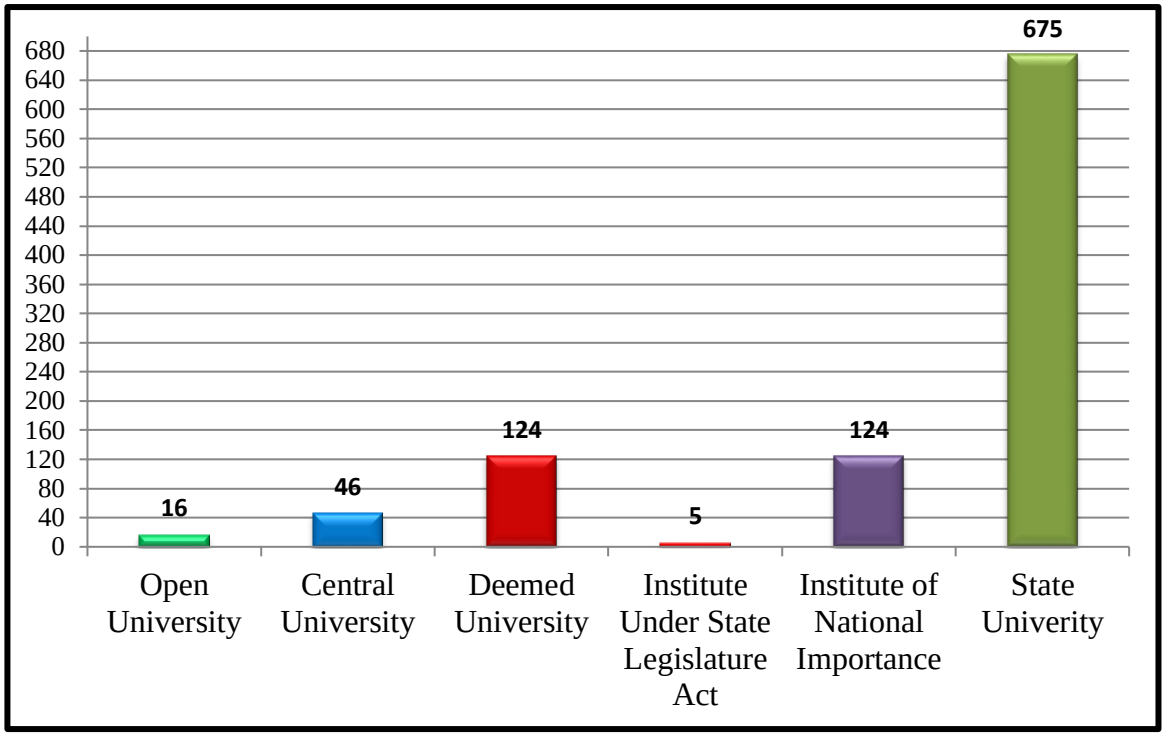
Higher education plays an important role in the growth of a nation as it is seen as a effective means to of creating a knowledge-based society. India's higher education system is the world's third-largest in terms of students, next to China and the United States (Sheikh, 2017). India's higher education 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 programs, networking, adoption of information technology, and distance learning along 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 focusing on the number of universities and colleges for enlargement of 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: 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 stern 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 reasons behind this could be the issues and challenges faced by Indian higher education system.

5.1.3 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 they 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 basic 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, however, consistently focuses on quality education. Still, large numbers of colleges and universities in India are unable to meet the minimum standards set by the UGC and universities are not capable 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. Study in higher education institutes is inadequately focused. There are inadequate services and facilities for counseling students, as well as small numbers of qualified faculty. 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).

5.1.4 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.

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 teacher is important to execute and use ICT effectively in teaching-learning.

5.1.5 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 current years. ICT is becoming increasingly significant in daily lives and educational systems. As the teacher plays significant role in the management of learning, teachers should equip themselves with ICT competencies to design new learning environments using the contemporary 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 flexibility 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 successful functioning of ICT in the educational system, teachers need to accept the major challenges of re-thinking and re-framing their roles and competencies from that of knowledge-generators to knowledge-facilitators.

An essential step may call for a re-appraisal of the traditional role of teachers in India, where teachers are 'gurus', at par with the divine agencies and beyond questioning. Beside an ethical/spiritual revamping of their roles, on a more pragmatic level, teachers should be competent enough to employ particular applications and be proficient with computers, be confident to integrate ICT into existing curricula, and also essay modifications of traditional educational theories and practices to enable futuristic demands of the emerging 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 the first 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.

5.1.6 Initiatives for Integrating ICT in Higher Education

For supporting teachers and enhancing the quality of the teaching-learning process through ICT numerous efforts has been done by the government. 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 (Snehi, 2009). According to National Education Policy 2020 an autonomous body, the National Educational Alliance for Technology (NEAT), will be created to provide a platform for use of technology to enhance learning, assessment, planning, administration, and so on, both for school and higher education. A rich

variety of educational software will be developed and made available for students and teachers at all levels. All such software will be available in all major Indian languages and will be accessible to a wide range of users including students in remote areas and with disabilities. The thrust of technological interventions will be for the purposes of improving teaching-learning and evaluation processes, supporting teacher preparation and professional development, enhancing educational access, and streamlining educational planning and management including processes related to admissions, attendance, assessments, etc. (Ministry of Human Resource Development, 2020)

The National Education Policy 2020 recognizes the importance of leveraging the advantages of technology while acknowledging its potential risks and dangers. It calls for carefully designed and appropriately scaled pilot studies to determine how the benefits of online/digital education can be reaped while addressing or mitigating the downsides. In the meantime, 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).

Different programmes started by the government based on ICT to promote and encourage use and integration of ICT such as the National Mission on Education through Information and Communication Technology (NMEICT), SWAYAM, National Programme on Technology Enhanced Learning (NPTEL), EPathshala, and INFLIBNET etc. UGC also made number of attempts to incorporate ICT in higher education such as the "ICT for teaching and learning process" for achieving quality and excellence in higher education. UGC also launched a programme 'UGC INFONET', a network of Indian Universities and Colleges, by integrating (ICT) in the process of teaching, learning and education management. As per UGC guideline university teachers has to perform three basic roles that are teaching, research, and extension.

Teaching includes a number of things from formal transmission of information to exchange of related materials, interaction with other teachers and students, record keeping of students, individualized teaching, management of learning and many more.

In research work also teacher need to manage different task, which includes a search for information, store the data, identification of sponsorship, contacting with other researchers, publicizing the data and many more. ICT helps in performing all of the

above-mentioned task through the available different computer and internet-based tools.

5.1.7 ICT tools for Teaching

There are various ICT tools available which can be utilized for knowledge creation and dissemination in the modern world. Tools include Radio, T.V, Internet, Mobile phone, Computer, laptop, tablets, and many other hardware and software applications. Number of ICT tools is available online which can be used for teaching and research purposes which are as follow:

- GoogleScholar – Provides a way to broadly search for scholarly literature across disciplines and sources.
- Academia Edu. – A place to share and follow research and researchers.
- ResearchGate – Social network for researchers.
- Mendeley – A unique platform comprising a social network, reference manager, article visualization tools.
- Unplag: plagiarism checker for uncovering academic dishonesty, since the system spots text similarities in student works.
- Google Docs to share materials so students can collaborate on a shared project, or posting homework assignments to a class website for everyone to access.
- Pinterest: Create a private board to share snapshots of classroom activities, projects, and field trips, or encourage parents to connect and find ways to help show their support for the classroom.
- Clickers: One way to encourage student engagement is by using electronic devices that allow students to record their answers to multiple choice questions and allow you to instantly display the results.
- 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.

Beyond these, there are many more tools available which a teacher can use for teaching and research based activities. So the discussion gives an idea about the need for ICT in

education and efforts by Government of India for incorporating ICT tools in Indian higher education. It is a role of teacher to incorporate ICT tools in teaching-learning, research and administration as well as motivate students to use different ICT tools for learning. It is a need of an hour to find out whether the higher education institutes teachers are using and integrating ICT or not and for this a systematic study is required. 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?

5.1.8 Statement of the Problem

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

5.1.9 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 smartphones 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.

5.1.10 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.

5.1.11 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.

5.1.12 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.

5.1.12 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.

5.1.13 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.

5.1.14 Delimitations

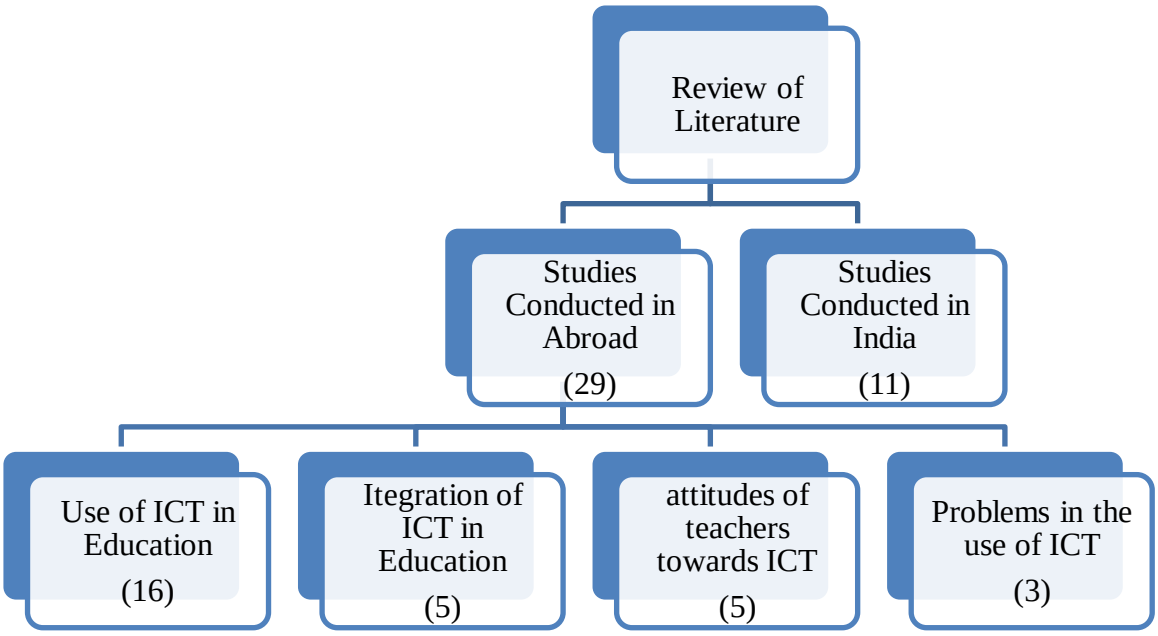
- The study is delimited to the faculty members of The Maharaja Sayajirao University of Baroda, Vadodara.
- The study is delimitated to the usage, integration, influence, problems faced in the usage of ICT in academic activities by the faculty members of The Maharaja Sayajirao University of Baroda, Vadodara.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

5.1.15 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.

5.2 Review of Literature

The present study aims to find out the use and integration of ICT by faculty members of The Maharaja Sayajirao University of Baroda, Vadodara. The opinions regarding ICT and problems faced by faculty members while integrating ICT were also studied. The review of related literature was conducted by referring different research studies on use of ICT by university teachers, integration of ICT, ICT and teaching learning, ICT for teaching and research.



The research trend was observed from the in-depth review of the literature. The empirical studies referred and reviewed were related to use of ICT, integration of ICT, impact of ICT and barriers to integrate ICT in teaching –learning. The timeline for reviewed studies ranged from 2009-2019. Thirty two studies were reviewed in the aforementioned categories. It was noted in all the reviewed studies that survey method was used for quantitative data collection, whereas interview and observation methods were used for qualitative data collection. Only one researcher used focus group discussion for qualitative data collection. The maximum sample size observed was 492 and the minimum size was 12. In seven studies sample were teachers as well as students and researchers. The sampling techniques observed in most of the reviewed researches were stratified random sampling, random sampling for quantitative data collection. Convenient sampling technique was used for qualitative data collection. The

variables studies in most of the reviewed researches were gender, ICT competency, type of university, discipline, teaching experience and age among faculty members.

All the past researches focused on use ICT, integration of ICT, ICT competency and barriers to integrate ICT. Some of the researches also focused on the attitudes of the teachers towards ICT. The studies conducted in India focused on the use of ICT and use of e-resources. It was also observed from the reviewed Indian studies that the teachers have knowledge about renowned resources and they use it for teaching. These studies also focused on attitude of the teachers towards ICT and impact of ICT. Only one reviewed research focused on ICT competency. The variable studied in most of the reviewed researches were gender, discipline, place of residence and teaching classes. None of the reviewed study focused on opinions of teachers towards ICT and infrastructure availability in the campus.

However, total 29 foreign studies were collected and reviewed. The studies were conducted in different countries of North and East Africa, Iran, Pakistan, Vietnam, Japan and Canada. The reviewed researches were related to use and integration of ICT, opinions or attitude of teachers towards ICT and barriers and challenges faced by teachers in use of ICT. Questionnaire, interview and observation were used as a tool for data collection in the reviewed researches. The findings of the reviewed researches indicated that university teachers were using different ICT tool in teaching and learning, their attitude affects the use of ICT in teaching and gender has no relation on use of ICT in teaching learning. The findings of the study also revealed that teachers face problems in use of ICT.

From the above research trend, it can be concluded that university teachers are using and integrating ICT in teaching learning process irrespective of their age, designation and discipline. The use of ICT was higher with low level of competency. The review of the literature highlighted the research gaps existed in the reviewed studies. None of the research focused on the opinions of the teachers regarding ICT and influence of ICT on research and administration work. All the reviewed researches focused on the use and integration of ICT in teaching. None of the studies focused on the use and integration f ICT in research work and administration work by the university teachers. The present study is an attempt to understand the use and integration of ICT by the teachers of The Maharaja Sayajirao University of Baroda, Vadodara.

5.3 Methodology

The present research was undertaken to study the Information and Communication Technology in Higher Education. The purpose of the present study was to understand the use and integration of ICT by faculty members in teaching, research, and administration work. It also focuses on the influence of ICT on the professional work of the faculty members as well as to understand the problems faced by faculty members in the use of ICT. The survey method was used in this study with a quantitative method for data collection. The present chapter describes the steps followed in conducting present research which were as below:

Feasibility study
Population of the Study
Sample of the Study
Construction of the Research Tool
Validation of the Tool
Reliability of the Tool
Pre-testing of the Tool
Procedure of Data Collection
Scoring and Categorization
Plan for Statistical Analysis

5.3.1 Feasibility study

To know the feasibility of studying, information and communication technology usage by faculty members in higher education, a pilot study was carried out between April 2017 - May 2017 at the Maharaja Sayajirao University of Baroda, Vadodara. It was carried out to investigate the learning strategies adopted by the faculty members in acquiring internet skills. To study the frequency and purpose of using internet services by the faculty members for professional work. Examine the influence of the internet on the various academic, personal, and administrative activities of the faculty members and problems by the faculty members in use of internet. The sample of the study was selected through a purposive sampling technique. Thirty teaching faculty members were selected from a discipline like arts, commerce, social science, and technology and

engineering of the Maharaja Sayajirao University of Baroda, Vadodara. A structured questionnaire was prepared for data collection.

The findings of the feasibility study revealed that faculty members of the Maharaja Sayajirao University of Baroda were using ICT for executing their teaching, research, and administrative work. The findings of the study revealed that the main reasons for using the internet were to transact educational work, research work, and establish communication with others.

All faculty members have to perform the task of teaching, research, and administrative work. They need to plan, organize, manage the information, and accomplish those tasks. The results of the feasibility study suggest that ICT may act as an aid to perform their entire task. Through, the feasibility study, it was understood that all the faculty members were using the internet for their numerous professional work. Also, the results of the feasibility study found the influence of the internet on the performance of the faculty members related to their professional work. Therefore it was decided to study the use and integration of information and communication technology by faculty members teaching in the higher education sector.

The results of the feasibility study showed that faculty members were using the internet for different reasons. It was found that faculty members were using the internet in teaching, research, and administrative work through being from different age groups, designation, gender, discipline, and competency in using ICT. These variables are feasible to undertake a research study on a similar topic. To find faculty members' use and integration of ICT in teaching, research, and administrative work, an exploratory study need to be carried out. Hence, the study on “Information and Communication Technology in Higher Education” was undertaken.

5.3.2 Population of the Study

The population of the study comprised of all the faculty members of The Maharaja Sayajirao University of Baroda, Vadodara. The university has around 1200 faculty members (www.msubaroda.ac.in) in the fourteen different faculties in the year 2017-18.

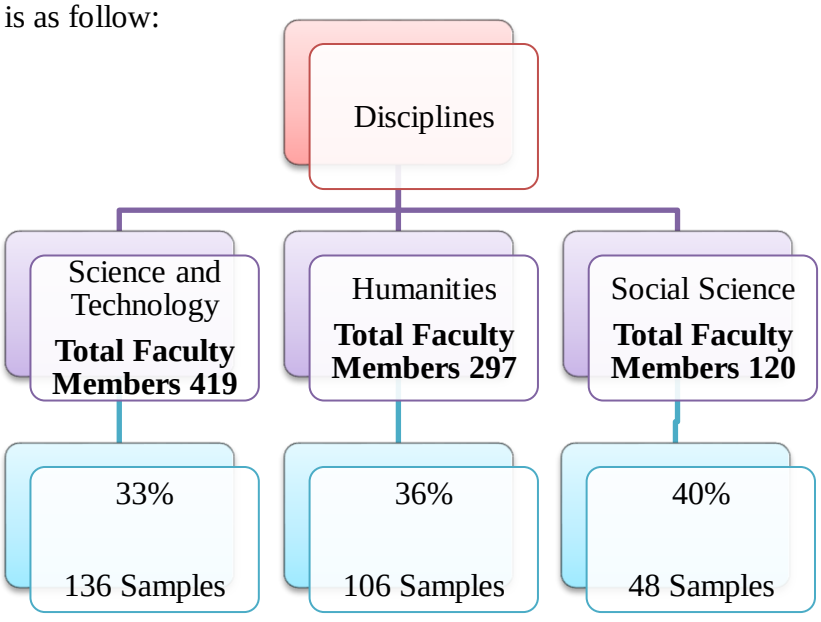
5.3.3 Sample of the Study

Quantitative data were collected for this study using the survey method. The Maharaja Sayajirao University has a total of 14 faculties. All the faculties of the university were purposively categorized into three categories except the Faculty of Medicine. The Faculty of Medicine was not selected for the study due the unavailability of teaching staff beyond their teaching hour.

Discipline of Study

Science and Technology	Humanities	Social Science
• Faculty of Science • Faculty of Technology and Engineering • Faculty of Pharmacy	• Faculty of Arts • Faculty of Commerce • Faculty of Fine Arts • Faculty of Performing Arts • Faculty of Management Studies	• Faculty of Family and Community Sciences • Faculty of Education and Psychology • Faculty of Social Work • Faculty of Journalism and Communication • Faculty of Law

It was decided to select 30% to 40% samples of the total population of the particular category through purposive convenient sampling method and as per the availability of the faculty members between the period of data collection that was from November 2018 to May 2019. The detail about the total number of teaching faculty members was collected from the university diary of 2017-18. The percentage distribution of samples from each category is as follow:



In total, two hundred and ninety faculty members were selected from three categories by using a purposive convenient sampling method to collect the data.

5.3.4 Construction of the Research Tool

The research tool is the backbone of any research. Construction of good research tools decides the quality of data and ultimately the quality of research. A questionnaire, rating scales were designed to collect quantitative data. The tool was designed by thoroughly reviewing related literature.

The research tool was constructed in line with the objectives of the study by refereeing related review of the literature. The researcher referred to research studies related to the present study to prepare the desired research tool. To get detailed and desired data, a questionnaire was designed with eight sections. These sections were divided according to the objectives of the study. They were related to the profile of the respondents, their ICT usage, opinions regarding ICT, their integration of ICT, problems faced by them in use of ICT, the influence of ICT, and suggestion to improve the use of ICT.

Table:- Description of the Research Tool

Section	Content	Response System
I	Background Information (Age, Designation, Discipline, ICT availability in the department)	Checklist
II	Use of ICT (frequency and duration of using ICT, types of ICT used)	Checklist, Open-ended Three-Point Rating Scale
III	Opinions about ICT	Thee Point Rating Scale
IV	Competency in using ICT	Thee Point Rating Scale
V	Integration of ICT	Thee Point Rating Scale
VI	Problems in the integration of ICT	Thee Point Rating Scale
VII	Influence of ICT	Thee Point Rating Scale
VIII	Suggestions	Open-ended

Above table highlights the eight sections of the research tool. The details of it are as follows:

Section I – Background Information

Section I of the research tool was designed to obtain data related to the profile of the faculty members. It includes questions related to their –

- Age
- Designation
- Gender
- Experience in teaching and research
- Availability of different ICT resources in the department.
- Training/workshops/courses attended related to ICT

Section II – Use of ICT

This segment dealt with collecting information on the use of ICT by respondents. It includes questions related to

- Frequency of using desktop/laptop with internet and without internet
- Duration of using desktop/laptop
- Gadgets used to access the internet
- Help required to use ICT
- Use of ICT in performing different duties at different levels.
- Use of computer accessories
- Use of e-resources accessible through Hansa Mehta Library Portal in teaching and research
- Use of ICT in teaching, research, and administrative work. It includes items related to hardware use, use of services provided by the university, and use of the software.
- Use of internet-based ICT resources in teaching and research. It includes items related to information resources, collaborative resources, learning resources, reference managing, and data storage software

Section III – Opinions regarding ICT

Section III was structured to gather information on one of the independent variables of the present analysis , i.e. opinions of faculty members towards ICT. Both positive and negative statements related to opinions were prepared by reviewing similar research studies. A three-point rating scale was prepared wherein the respondents had to tick mark against their agreement level for the given statements. A total of twenty-six items

were included in this section to the extent of opinions of the faculty members regarding ICT.

Section IV – Competency in using ICT

Section IV was prepared to obtain data related to competency in using ICT. Competency was divided into three aspects namely hardware related competency, software-related competency, and internet-related competency. These categories were made by reviewing a similar type of research articles and related literature. A three-point rating scale was prepared wherein the respondents had to tick mark whether they use ICT alone without any one's help, with some one's help or they do not know how to use ICT.

Section V – Integration of ICT

This section was made to gather responses related to one of the dependent variables of the present study i.e. integration of ICT. In this section, the responses were collected about the integration of ICT in teaching, integration of ICT in research, and integration of ICT in administrative work. For each statement, a three-point scale was prepared to collect their responses. Faculty members had to provide their responses in terms of integrating ICT in their teaching, research, and administrative work. The statements were prepared after reviewing related literature and with the help of the results of the feasibility study.

Section VI – Problems in the Integration of ICT

Section VI contained a three rating point scale prepared to obtain data related to the problems faced by respondents while integrating the ICT in teaching, research, and administrative work. The statements prepared were related to human-resource-related problems and nonhuman resource-related problems. Thirty-eight statements were stated to collect the responses. The respondents were asked to provide their responses in terms of their agreement level for the given statements.

Section VII – Influence of ICT

This section obtains the data about one of the dependent variable i.e. influence of ICT on respondents teaching, research, and administrative work. Both positive and negative statements related to influence were prepared by reviewing similar studies. The response system used here was the three-point rating scale. They had to provide their

responses in terms of their agreement level for the given statements. A total of thirty-five statements were prepared to obtain the responses.

Section VIII – Suggestions

Section VIII was made to gather suggestions from the respondents regarding improving the integration of ICT. This section was kept open-ended wherein respondents had to write about their suggestions regarding improving the integration of ICT. Three questions were asked related to improving the integration of ICT in teaching, research, and administrative work.

Validation of the Tool

The content validity was checked for the developed research tool. The developed questionnaire was given to experts from different fields. The experts were asked to provide their valuable suggestions in terms of its content, appropriateness of response system and language clarity. The Experts approached were from the following faculties:-

- Professor and Head, Department of Extension and Communication, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara
- Professor, Department of Extension and Communication, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara
- Associate Professor, Department of Extension and Communication, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara
- Professor, Department of Education, Faculty of Education and Psychology The Maharaja Sayajirao University of Baroda, Vadodara
- Professor, Department of Educational Administration, Faculty of Education and Psychology, The Maharaja Sayajirao University of Baroda, Vadodara
- Assistant Professor, Department of Statistics, Faculty of Science, The Maharaja Sayajirao University of Baroda, Vadodara

The suggestions given by the experts were incorporated into the research tool. These suggestions were related to the sequencing of the questions and additions of the statements in the different sections.

5.3.5 Reliability of the Research Tool

To check the reliability of the research tool, the test-retest method was used. The tool was administered to ten respondents. The respondents filed the questionnaire twice in the gap of fifteen days. The coefficient of correlation between the two sets of scores was calculated. The tool was found reliable at 0.958 levels which showed that it was highly reliable.

5.3.6 Feasibility study Pre-testing of the Tool

The pre-testing of the tool was undertaken with ten faculty members teaching at the Maharaja Sayajirao University of Baroda. The purpose of pre-testing was to know whether the respondents face any difficulty while filling up the questionnaire. The repetition of the questions was identified in the pre-testing and necessary changes were implemented before finalizing the tool for the data collection. The respondent did not find any major problem in filling the questionnaire and the tool was found clear and understandable. It took twenty to twenty-five minutes to fill the questionnaire.

5.3.7 Procedure for Data Collection

The data was personally collected by the investigator by administering the questionnaire from November 2018- May 2019. All the selected faculties were covered by the researcher one by one for data collection. Before visiting the respondents, the investigator contacted the heads of the department and took their permission for the data collection from their department. The questionnaire was distributed amongst the faculty members of each department and they were requested to fill the questionnaire. The respondents returned the questionnaire within eight to ten days. The data was also collected through e-mail. The questionnaire was uploaded on "Google Forms" and a web link was created to fill it up. The weblink was shared via email and WhatsApp. The response rate through online mode was very low. Only two forms were filled online. Faculty members preferred filling up the forms offline due to the length of the questionnaire.

Nearly five hundred and seventy-five forms were distributed amongst the faculty members for the data collection. Out of which 298 questionnaires were received back. The reasons for receiving less number of questionnaires, despite distributing more than five hundred questionnaire were due to –

- Length of the questionnaire
- The busy schedule of the faculty members
- Unavailability of the faculty members in the department despite repeated visits at a different time of the day.
- The unwillingness of the respondents to fill the questionnaire
- Some of the faculty members lost the questionnaire and never returned.

Later two hundred and ninety questionnaires were selected as data-generating questionnaires with a 50.43% response rate. The reasons for the exclusion of the remaining eight forms were-

- Incomplete information provided by the respondents.
- Respondents had not answered the questions properly.

5.3.8 Scoring and Categorization of Variables

The independent and dependent variables of the study were categories as follows-

Table: Categorization of Independent Variables of the Study

Independent Variables	Basis	Categories
Age	24-32 Years	Young Aged Teachers
	33-43 Years	Middle Aged Teachers
	44-62 Years	Senior Teachers
Designation	Professor	Professor
	Associate Professor	Associate Professor
	Assistant Professor	Assistant Professor
	Temporary Assistant Professor	Temporary Assistant Professor
	Temporary Teaching Assistant	Temporary Teaching Assistant
Discipline	Faculty of Technology and Engineering Faculty of Science Faculty of Pharmacy	Science and Technology
	Faculty of Arts Faculty of Commerce Faculty of Fine Arts Faculty of Performing Arts Faculty of Management Studies	Humanities
	Faculty of Family and Community Sciences Faculty of Education and Psychology Faculty of Social Work Faculty of Journalism and Communication Faculty of Law	Social Science
Opinions towards ICT	63-103	Favorable
	26-62	Unfavorable
Competency in Using ICT	93-123	Highly Competent
	86-92	Moderately Competent
	42-85	Less Competent
Technology Infrastructure	7-21	Good
	0-6	Poor

Table: Categorization of Dependent Variables

Dependent Variables	Basis	Categories
Use of ICT	238-380	High Usage
	199-237	Moderate Usage
	153-198	Low Usage
Integration of ICT	105-177	High Integration
	86-104	Moderate Integration
	42-85	Low Integration
Problems faced in the Integration of ICT	73-238	More Problems
	60-72	Moderate Problems
	38-59	Few Problems
Influence of ICT	94-185	High Influence
	82-93	Moderate Influence
	38-81	Less Influence

Scoring of Opinions about ICT

A three-point rating scale was used to get the responses for opinions of the respondents about ICT. In this section total, twenty-six statements were included. Which were indicated positive (16) and negative (10) opinions about ICT.

Table: Score Provided for Different Responses of Opinions about ICT of Faculty

Responses	The score for Positive items	The score for Negative items
Agreed to a great extent	3	1
Agreed to some extent	2	2
Agreed to a less extent	1	3

The scores achieved by the respondents ranged from 26 to 78 and they were categorized as follows:

Table: Minimum and Maximum Obtained Scores for Overall Opinions about the ICT

Opinions about ICT	No. of Items	Maximum Obtained Score	Minimum Obtained Score
Overall	26	78	26

The range of intensity indices was calculated overall and statement wise to study the opinions of the faculty members regarding ICT. To describe opinions the range of intensity indices were decided as follows:

Table: The Range of Intensity Indices

Extent	Range of Intensity Indices
Great Extent	2.31 – 3.00
Some Extent	1.61 – 2.30
Less Extent	1.0 – 1.60

Scoring of Competency in Using ICT

A three-point rating scale was used to study the competency of faculty members in using different ICT resources. Competencies were categorized as hardware related competency, software-related competency, and internet-related competency.

Table: Score Provided for Different Responses of Competency of Faculty Members in Using ICT

Responses	Score	Range of Intensity Indices
Alone without any one's help	3	2.31 – 3.00
With some one's help	2	1.61 – 2.30
Do not know	1	1.00 – 1.60

Table: Scoring of Data for Overall Competency and Category wise Competency

Categories	No. of Items	Maximum Obtained Score	Minimum Obtained Score
Overall	32	96	32
Hardware Related Competency	9	27	9
Software Related Competency	10	30	10
Internet Related Competency	13	39	13

Scoring of Use of ICT

The ICT usage was calculated by time spent on desktop/laptop with internet and without internet, a device used to access the internet, help required for using ICT, computer accessories used, use of e-resources available on Smt. Hansa Mehta Library Portal for teaching and research, use of hardware, services, and software for teaching, research and administration and use of information resources, collaborative resources, learning resources, and reference managing and data storage software.

Table: Scoring of ICT Usage

ICT Usage	Minimum Scores	Maximum Scores
	155	476

Scoring of integration of ICT

The integration of ICT was studied with a three-point rating scale. Integration was studied with three aspects i.e. integration of ICT in teaching, integration of ICT in research, and integration of ICT in administrative work.

Table: Score Provided for Different Responses of integration of ICT by the Faculty Members in teaching, research, and administrative work

Responses	Score	Range of Intensity Indices
Great Extent	3	2.31 – 3.00
Some Extent	2	1.61 – 2.30
Less Extent	1	1.00 – 1.60

Table: Scoring of Data for Overall integration and Category wise Integration

Categories	No. of Items	Maximum Obtained Score	Minimum Obtained Score
Overall	42	126	42
Integration of ICT in teaching	16	48	16
Integration of ICT in research	14	42	14
Integration of ICT in administrative work	12	36	12

Scoring of Problems faced in Use of ICT

Problems faced by faculty members in the integration of ICT were studied with a three-point rating scale. Problems were categorized into two categories viz. non-human resources related problems and human resource-related problems

Table: Score Provided for Different Responses of integration of ICT by the Faculty Members in teaching, research, and administrative work

Responses	Score	Range of Intensity Indices
Great Extent	3	2.31 – 3.00
Some Extent	2	1.61 – 2.30
Less Extent	1	1.00 – 1.60

Table: Scoring of Data for Overall integration and Category wise Integration

Categories	No. of Items	Maximum Obtained Score	Minimum Obtained Score
Overall	38	114	38
Non-human resources related problems	16	48	16
Human resources related problems	22	66	22

Scoring of Influence of ICT

A three-point rating scale was used to study the influence of ICT on the professional work of the faculty members. The influence of ICT was studied for three aspects i.e. the influence of ICT on teaching, the influence of ICT on research, and the influence of ICT on administrative work. Both positive and negative statements were included. A total of 6 negatives and 29 positive statements were included.

Table: Score Provided for Different Responses of influence of ICT on the Teaching, Research and Administrative Work of the Faculty Members

Responses	The score for Positive Items	The score for Negative Items	Range of Intensity Indices
Great Extent	3	1	2.31 – 3.00
Some Extent	2	2	1.61 – 2.30
Less Extent	1	3	1.00 – 1.60

Table: Scoring of Data for Overall Influence and Category wise Influence

Categories	No. of Items	Maximum Obtained Score	Minimum Obtained Score
Overall	35	105	35
Influence of ICT on Teaching	13	39	13
Influence of ICT on Research	14	42	14
Influence of ICT on Administrative Work	8	24	8

5.3.9 Plan of Statistical Analysis

Different statistical measures were used to analyze the collected data. The data were coded and analyzed using computer software namely M. S. Excel and SPSS. The statistical measures used were as follows:

Table: Statistical Measures Used to Analyze the Data

Content	Statistical Measures
Background information of faculty members	Frequency and percentage
Use of ICT	Frequency and Percentage, T-Test, ANOVA (F-Test)
Opinions about ICT	Frequency and Percentage, Intensity Indices
Competency in using ICT	Frequency and Percentage, Intensity Indices
Integration of ICT in teaching, research, and administrative work	Frequency and Percentage, Intensity Indices, T-Test, ANOVA (F-Test)
Influence of ICT in teaching, research, and administrative work	Frequency and Percentage, Intensity Indices, T-Test, ANOVA (F-Test)
Problems faced in the integration of ICT	Frequency and Percentage, Intensity Indices, T-Test, ANOVA (F-Test)

5.4 Findings of the Study

5.4.1 Profile of the Faculty Members

- More than one third (34.8%) of the faculty members were young teachers whereas thirty-one percent of the faculty members were in their middle age. Faculty members from the late adulthood aged group (33.8%) were also the respondents for the present study.
- Little less than a majority (58.3%) of the faculty members was female whereas forty-one percent of the faculty members were male.
- The findings of the study revealed that nearly fifty percent of the samples were Temporary Teaching Assistant and Temporary Assistant Professor. Higher percentages (29%) were Assistant Professors, whereas nearly fifteen percent (14.5%) were professors. The lowest representation was from Associate Professor (8.6%).
- A higher percentage of the faculty members had five to fifteen years of teaching experience whereas a higher percentage of the faculty members had three to ten years of research experience.

- The findings of the study also revealed that the majority (69%) of the faculty members had access to university Wi-Fi on the campus. Nearly half of the faculty members had scanner and printers in their cabins/staff rooms. On the other hand, the LCD projector (8.3%), smart TV (2.1%), and interactive whiteboard (7.9%) were available to very few of them in their cabins/staff rooms.
- The findings of the study indicated that less than a majority (57.6%) of the faculty members learned computers and the internet by themselves. The results for guidance and training revealed that little less than forty percent (38.6%) and more than one third (32.4%) of the faculty members learned computers and the internet through guidance from colleagues and friends.
- The findings of the study revealed that the majority (77.2%) of the faculty members had not done any formal courses related to computers whereas twenty-two percent of the faculty members did the course related to computers like CCC, CCC+, Java Scripting, Basics of Computer.
- The findings of the study revealed that less than half (45.4%) of the faculty members did the course on computer concepts (CCC, C++) whereas, one-third of the faculty members did the course related to basics of computer which includes Paint, M.S.Office, computer fundamentals, etc. Little more than twenty percent (22.7%) of the faculty members completed the course on computer programming whereas very few (6%) of them attended the internet related course.
- the majority (77.9%) of the faculty members did not attend any training programme/workshop related to ICT whereas twenty-two percent of the faculty members attended the training programme/workshop related to ICT.
- Half (50%) of the faculty members attended workshops or seminars on the use and integration of ICT in education whereas little more than one fifth (23.4%) of the faculty members attended the workshop on the use of e-resource.

5.4.2 Usage of ICT by the Faculty Members

- Majority (76.2%) of the faculty members were using a computer daily. A higher percentage of the faculty members (47.2%) were spending 2 to 4 hours per day on desktop/laptop for their professional work whereas thirty-two percent of the

faculty members were spending less than 2 hours on desktop/laptop without internet per day.

- The majority (67.9%) of the faculty members were using University Wi-Fi to access the internet on the campus. The faculty members reported that they were using mobile data (64.5%) to access the internet on the campus. The findings of the study also revealed broadband (22.8%) and dongle (12.4%) were also used by the faculty members to access the internet on the campus for professional work.
- A higher percentage (57.2%) of the faculty members was spending 2 to 3 hours per day on the internet for their professional work. little more than twenty percent (21.7%) of the faculty members were spending less than 1 hour on the internet for professional work whereas eight percent of the faculty members were spending more than 5 hours also on the internet for their professional work.
- A high majority of the faculty members were using Pen Drive (95.2%), Printer (89.7%), whereas the majority of them were using Scanner (71%) and Hard Disk (66.2%). Mouse Pad (58.3%) and Cables Connectors (53.4%) were used by to majority of the faculty members. It is also evident from the findings that equal percent (43%) of the faculty members were using Speakers and Wireless Mouse. The findings also highlighted that very few faculty members were using Graphic Tablet (3.4%), PC Microphones (11.7%), and Gamepad (1%).
- A high majority of the faculty members were rarely/never used the resources available on Hansa Mehta Library Portal. More than one fourth (29%) of the faculty members were using e-resources sometimes for teaching whereas twenty-one percent of the faculty members were using science magazine sometime for teaching. More than fifteen percent of the faculty members were using e-shodhsindhu some time and most of the time for teaching. One fourth (25%) of the faculty members were using e-resources most of the time for research work whereas very few (13%) of them were using J-Gate most of the time for research work. Sixteen percent of the faculty members were using e-shodhsindu for research work.
- Nearly half (49%) of them were using desktop/laptop most of the time for teaching, research, and administrative work. Less than one-fourth of the faculty

members use LCD (24%) projector either sometimes or most of the time for teaching. The data related to the use of software shows that the majority (60%) of the faculty members were using M. S. Word most of the time in teaching whereas more than forty percent of them were using it for administrative work. Higher percentages of the faculty members were using PowerPoint presentations in teaching whereas forty percent of them were using PPT for research work.

- A higher percentage of the faculty members were using e-journals (44%) and online journal articles (42%) most of the time for their research work. It is also evident from the data that a higher percentage of the faculty members were using all Webgraphy more for the research work than the teaching. A higher percentage of the faculty members were using Wikipedia most of the time for teaching than research. The data related to collaborative resources indicates that equal percent (22%) of the faculty members were using collaborative tools some times for research work and blogs sometimes for teaching purposes. Almost equal percent and of the faculty members were using Google Drive most of the time for teaching (41%) and research work (40%). More faculty members were using Dropbox for teaching purposes than the research work. All other reference managing and data storage software were rarely or never used by the high majority of the faculty members for teaching and research work.
- Almost equal percent (33%) of the faculty members had high, moderate, and low ICT usage. A higher percentage of the faculty members belonging to young age group, social science discipline, Temporary Assistant Professor with unfavorable opinions towards ICT and with good technological infrastructure in the department had high usage of ICT.
- In relation to faculty members' opinions towards ICT there was no significant difference in the overall usage of ICT. In relation to technological infrastructure there was a significant difference. It revealed that faculty members with good technological infrastructure had more usage of ICT.
- No significant difference found in the overall usage of ICT in relation to the designation of the faculty members and problems faced in the integration of ICT. There was a significant difference in the usage of ICT in relation to the

discipline, age, competency in using ICT, integration of ICT, and the influence of ICT.

5.4.3 Opinions of the Faculty towards ICT

- More than half of the faculty members (54.1%) had favorable opinions towards ICT whereas forty-five percent of the faculties had unfavorable opinions towards ICT.
- A higher percentage of the faculty members belonging to all age groups, all designations, Science and Technology, Humanities, and, with high, moderate and low competency in using ICT had favorable opinions.
- Faculty members agreed on having favorable opinions towards ICT to a great extent with regards to it improves the quality of teaching and make it more effective, helps in producing varied teaching materials, raise the working efficiency of a teacher, it makes the lectures more interesting and diverse, essential to prepare students to live and work in the 21st century, facilitates teaching strategies.
- The findings also revealed that faculty members were agreed to less extent for the negative opinions towards ICT. It shows that faculty members had more positive opinions.

5.4.4 Competency in Using ICT

- A little higher percentage (33.10%) had high competency than teaching faculty having moderate (31.04%) competency. A higher percentage of faculty members (35.86%) were less competent in using ICT.
- A higher percentage of the faculty members belonging to middle-aged group and in late adulthood, Humanities, Temporary Assistant Professors and Professors, Poor technological infrastructure in the department admitted about less competency in using ICT.
- Overall intensity indices regarding the competency of faculty members in using ICT ranged from 2.94 to 2.23. It means that faculty members' competency in using ICT ranged from high competency to a moderate level of competency.
- Faculty members were high competent in using USB drive, printer, internet for communication, PowerPoint Presentation, check circulars on the university

website, search material online (like e-books, e-journals), downloading online videos, save videos offline.

- The faculty members had a moderate level of competency with regards to conducting virtual classes, preparing Infographics, and designing technology-enhanced learning material for students (like an online course, website).

5.4.5 Overall Integration of ICT

- A higher percentage of faculty members integrated ICT to a lower extent in their professional work. On the other hand, data also revealed that equal percent (32.4%) of the faculty members integrate ICT in their professional work at a high and moderate level.
- the faculty members belonging to young age group, Social Science discipline, Temporary Teaching Assistants and Professors and Faculty members having the good technological infrastructure in the department had overall high integration of ICT in their professional work.

5.4.6 Integration of ICT in Teaching

- A higher percentage of the faculty members integrate ICT into their teaching work at a moderate level.
- In relation to their opinions towards ICT there was a significant difference in the integration of ICT in teaching. It indicates that the opinion wise differences exist with respect to the integration of ICT in teaching. Those who had unfavorable opinions integrated technology to a higher level.
- There was no significant difference in the integration of ICT in teaching in relation to technological infrastructure. It shows that the technological infrastructure wise difference does not exist with respect to the integration of ICT.
- There was a significant differences in the integration of ICT in teaching in relation to competency in using ICT, usage of ICT and influence of ICT.
- The integration of ICT in teaching the intensity indices ranged from 2.61 to 1.57. It means that ICT was integrated into teaching with different matters from high to less level.

- The faculties' integrate ICT in teaching to browse/search the internet to collect information to prepare class lectures, prepare presentations for the class, and create customized digital learning materials for the students, use online applications to connect with the students at a high level.
- It is also revealed from the findings that faculty members moderately integrate ICT in teaching with regards to design online course related to their subject, to prepare evaluation exercises (online test), participate in online discussion or forum and post online assignment for students.

5.4.7 Integration of ICT in Research Work

- The findings of the study reveal that the integration of ICT in research work amongst the higher percentage of the faculty members was low (35.5%).
- On the other hand, the findings of the study also found that an almost equal percentage of the faculty members integrate ICT in research work at high (31.4%) and moderate (33.1%) level.
- There was no significant difference in the integration of ICT in research work in relation to their opinions towards ICT and technological infrastructure. It indicated that the opinion wise and technological infrastructure wise difference does not exist with respect to the integration of ICT in research work.
- The findings of the study indicated that there were no significant differences in the integration of ICT in research work in relation to age, discipline, designation of the faculty members and problems faced in using ICT.
- There was a significant difference in the integration of ICT in research work by the faculty members in relation to their competency in using ICT, the use of ICT, and the influence of ICT.
- There was a difference in the integration of ICT between moderately competent and less competent as well as among highly competent and less competent faculty members. This can be interpreted as moderately competent and high competent faculty members integrate ICT more in their research work in comparison to less competent faculty members.
- Those having high and medium usage of ICT integrate more ICT in their research work than those reported less usage of ICT. The difference was also

found between high, moderate, and less influence. Those reported high and moderate influence of ICT on their professional work were integrated ICT might be more than those found less influence of it on their professional work.

- The itemise Intensity Indices shows the integration of ICT in research work by faculty members range from high to moderate level.
- The faculty members integrate ICT in research work to refer online books/journals to write reviews/articles/ books, to refer online thesis/projects for research, store research data and other important documents online at a great extent.
- The faculty members integrate ICT in research work to some extent with regards to check plagiarism, prepare and submit a research proposal to funding agencies, collect data through online data collection software and to prepare citation through reference managing software.

5.4.8 Integration of ICT in Administrative Work

- A higher percentage of the faculty members (3535%) integrate ICT into their administrative work to low level. On the other hand, more than thirty percent of the faculty members integrate ICT into their administrative work at a high (31.4%) and moderate level (333.4%).
- There was no significant difference in the integration of ICT in administrative work by faculty members in relation to their opinions regarding ICT. it means that the opinions of the faculty members do not affect the integration of ICT in the administrative work of the faculty members.
- Further, the data also revealed that there was no significant difference in the integration of ICT in administrative work in relation to technological infrastructure. This shows that technological infrastructure was neither the reason nor the barrier in the integration of ICT in administrative work by the faculty members.
- There was no significant difference was found in the integration of ICT in administrative work in relation to the age, designation, discipline and problems faced by faculty members in using ICT.
- There was a significant difference found in the integration of ICT in administrative work in relation to competency in using ICT, the use of ICT, and

the influence of ICT on the professional work of the faculty members. The results of the study show that faculty members who have moderate competency in using ICT integrate it more than the less competent faculty members. Highly competent integrate more ICT than the less competent faculty members in their administrative work.

- Faculty members with high and medium usage of ICT integrate more ICT in administrative work than the faculty members with low usage of ICT. There was a significant difference in the faculty members who had a high and moderate influence of ICT on their professional work than the faculty members who had less influence of ICT on their professional work.
- The item-wise intensity indices of the faculty members related to their integration of ICT in administrative work that ranged from 2.65 to 2.21. The faculty members integrate ICT in administrative work to a great extent for uploading annual report online, for circulating circulars amongst the colleague, to intimate staff about forthcoming events, for self-appraisal, downloading a blank mark list from university website for result submission and use computers for recruitment and work allotment to staff in the department.
- The findings also revealed that faculty members integrate ICT in administrative work to a moderate level to coordinate with other faculty teachers for administrative work, checking the government website for new policies related to higher education.

5.4.9 Overall Problems in Use of ICT

- The findings of the study revealed that a higher percentage of faculty members faced less problems in the use of ICT in their professional work. Findings also show that more than one-third of the faculty members had a high and moderate level of ICT competency.
- A higher percentage of the faculty members belonging to young and middle-aged, those from Humanity discipline, Temporary Teaching Assistant, high and less competent in using ICT and, faculty members having the poor technological infrastructure in the department faced more problems in using ICT in their professional work.

- Further, the data also reveals that a higher percentage of the faculty members from late adulthood, from science and technology discipline, Temporary Assistant Professor, Associate Professor, and Professors, having favorable opinions and who had the good technological infrastructure in the department faced less problems in the use of ICT.

5.4.10 Non-Human Resources Related Problems

- The finding shows that little less than forty percent (38.4%) of the faculty members faced a moderate level of non-human resources related problems while using ICT into their professional work.
- Further, the data also revealed that little more than one third (33.8%) of the faculty members faced the non-human resources related problems to a less extent whereas twenty-seven percent of the faculty members faced the more non-human resources related problems in the use of ICT in their professional work.
- The analysis of variance shows that there was a difference in non-human resources problems faced by faculty members in relation to their opinions towards ICT. The difference was not found in relation to technological infrastructure.
- There was no significant difference in the non-human resources related problems in relation to their age, designation, competency in using ICT, and use of ICT. It shows that the age-wise, designation wise, competency wise and use wise difference does not exist concerning the non-human resources related problems.
- There was a significant difference in the non-human resources related problems faced by them in using ICT in relation to their discipline, integration of ICT, and the influence of ICT.
- There was a difference in faculty members belonging to Humanity and Science and Technology. This can be interpreted that the faculty members belonging to Humanities faced more non-human resources related problems than their counterparts.
- A significant difference in high integration and less integration of ICT as well as moderate integration and less integration of ICT by the faculty members.

This can be interpreted that faculty members who integrate ICT in their professional work at high and moderate level faced more non-human resources related problems than their counterparts.

- The data also revealed that differences appeared in non-human resources related problems faced by faculty members who had a moderate level of influence of ICT on their professional work than the less influence of ICT.
- The overall intensity indices for non-human resources related problems faced by faculty members were moderate. The data indicate that faculty members faced technological infrastructure-related problems. These problems include lack of smart boards, lack of computers, uneven bandwidth of internet, slow internet connection, restriction on accessing certain websites, etc.

5.4.11 Human Resources Related Problems

- A higher percentage of the faculty members (36.2%) faced less human resources related problems in using ICT. It shows that faculty members received enough support from the technical staff of the university.
- Little less than thirty-five percent (34.5%) of the faculty members faced the problems at a moderate level and near to thirty percent (29.3%) of the faculty members faced more human resources related problems.
- There was no significant difference in the human resources related problems faced by faculty members in relation to their opinions towards ICT and technological infrastructure in the department. It means that human resources related problem do not vary as variation occurs in the opinions towards ICT and technological infrastructure.
- Analysis of variance shows that there was no significant difference found in human resources related problems faced by faculty members in relation to their age, designation, discipline, competency in using ICT, integration of ICT, use of ICT and influence of ICT. It means no variation was found in any selected variables with human resources related problems.
- The item-wise intensity indices for the human resources related problems faced by faculty members ranged from 1.82 to 1.37. The problems faced by them were ranged from moderate to less problems.

- The faculty members faced ICT training related problems, skills in using smart-boards, insufficient training on accessing material through H. M. Library Portal etc. at a moderate level.
- Faculty members faced less problems of uploading attachments in Annual Report Management System, students do not want to learn through ICT, ICT integration in teaching is not appreciated by the authorities; unable to using online application/software in their research, Unable to prepare ICT based content in English etc.

5.4.12 Overall Influence of ICT

- The findings of the study revealed that little less than half of the faculty members (48.6%) reported that ICT has less influence on their professional work. Further, the data also revealed that one third (30.7%) of the faculty members reported that ICT had a high influence on their professional work.
- A higher percentage of the faculty members belonging to the late adulthood age group, Humanity, Teaching Assistant, Associate Professor, and Professors, who had unfavorable opinions towards ICT reported a moderate level of the overall influence of ICT on their professional work.
- Higher percentage of the faculty members belonging to middle-aged, science and technology, Temporary Assistant Professors, with favorable opinions towards ICT, moderately competent in using ICT and with poor technological infrastructure in the department reported less influence of ICT on their professional work.
- A higher percentage of the young faculty members, belonging to social science, Assistant Professors, and good technological infrastructure in the department reported the overall high influence of ICT on their professional work.

5.4.13 Influence of ICT on Teaching Work

- The findings indicates that near to forty percent (38.3%) reported that ICT had a moderate level of influence on their teaching whereas little more than one third (34.8%) reported that ICT had influenced teaching to a less extent.
- The influence of ICT on the teaching of the faculty members found a significant difference in relation to their opinions towards ICT and technological

infrastructure. This indicates that differences in the opinions of the faculty members towards ICT and the availability of technology in the department the influenced teaching.

- There was no significant difference in the overall influence of ICT on the teaching of the faculty members in relation to their age, designation, and problems in the use of ICT. It means the influence of ICT on teaching was not varying as the variation occurs in their age, designation, and problems they faced in the use of ICT.
- There were significant differences in the influence of ICT on the teaching of faculty members in relation to their discipline, competency in using ICT, integration of ICT, and use of ICT.
- Faculty members who belong to social science discipline (31.46), with moderate (31.24) and high (30.11) competency in using ICT, had medium (29.91) and high (30.71) usage of ICT, integrate ICT high (31.1) and moderately (29.31) were reported the high influence of ICT on their teaching comparison to those who were from science and technology, humanities, had less competency in using ICT, low usage and integration of ICT.
- The overall intensity index for the influence of ICT on teaching was 2.21. This reflects that faculty members had an overall moderate influence of ICT on their teaching work.
- It further indicates that faculty members agreed to a great extent that due to ICT their lectures become more interesting to the students, they produced effective teaching material for a class, students participate more efficiently in class, their work efficiency as a teacher is raised, course content becomes live in the class and sharing of teaching notes with the students become easy.

5.4.14 Influence of ICT on Research Work

- The findings of the study highlighted that a higher percentage (36.6%) of the faculty members reported a moderate level of ICT influence on their research work whereas little more than one third (34.8%) faculty members found less influence of ICT on their research work.
- The analysis of variance showed that the differences were not found in the influence of ICT on the research work of the faculty members in relation to their

opinions towards ICT and technological infrastructure in the department. This indicates that variation in opinions and good and poor technological infrastructure were not the reasons for the influence of ICT on their research work.

- • The results indicate that there were no significant differences in the influence of ICT on the research work of faculty members in relation to their discipline, age, designation and problems in the use of ICT.
- Further, the data also revealed that there was a significant difference in the influence of ICT on research work of the faculty members in relation to their competency in using ICT, their overall integration of ICT, and their overall use of ICT.
- The findings of the post hoc showed that high and moderately competent faculty members reported the high influence of ICT on their research work than the less competent faculty members.
- The data presented in the above table also indicates the significant difference between high (40.61), moderate (31.81), and less (23.24) integration of ICT by faculty members. It shows that ICT influenced the research work of the faculty members who integrate it at the high and moderate extent.
- A significant difference between the influences of ICT on research work in relation to the use of ICT. Faculty members who use ICT at a high level were found more influence of it on their research work.
- The item-wise intensity indices indicate that faculty members reported a high level of agreement for the submissions of research papers for publication become easier, research work becomes faster and easier, writing a review of literature becomes very fast, access to own research data any time and from any place becomes easier, finding and submission of research proposals to funding agency become easy, contact with other researchers, who are working in the same research area has increased, and the storage of large research data becomes easier.

5.4.15 Influence of ICT on Administrative Work

- The findings of the study reveal that the majority (63.4%) of the faculty members reported a moderate level of influence of ICT on the administrative work carried out by them.
- Further, the data also revealed that little more than one third (33.4%) of the faculty members reported less influence whereas very few (3.10%) of them reported the high influence of ICT on their administrative work.
- There was no significant difference was found in the influence of ICT on the administrative work of the faculty members in relation to their opinions towards ICT and technological infrastructure.
- There was no significant difference in the influence of ICT on administrative work of the faculty members in relation to their discipline, age, designation, and problems faced by them in using ICT.
- The findings of the study reveal that faculty members who had moderate and high competency in using ICT found the influence of ICT on their administrative work than those who had less competency in using ICT. Similarly, those integrate ICT at the moderate and high levels found more influence of ICT on their administrative work than those who integrate it at less. Even the findings of the study also revealed the difference between high and moderate integration of ICT on the influence of ICT on the administrative work of the faculty members.
- The data also revealed that the faculty members who use ICT at the medium and high level found more influence than those who use it at a low level. It again shows that as competency, integration, and use of ICT increases the influence of it is also high.
- The item-wise intensity indices of the influence of ICT on administrative work ranged from 2.80-2.65. It shows that faculty members agreed to all the statements to a great extent. It shows that faculty members agreed that ICT made the administration more fast and easy, communication and coordination between staff become easier, and it added value to the paperless work.

5.4.16 Suggestion for Integration of ICT in Teaching

- Access of certain websites is restricted in university internet connection which limits the use of ICT, so this restriction should be removed.
- Faculty members' cabins/staff rooms, as well as all the classrooms, should be equipped with all the technological facilities.
- Good quality technology (including LCD projectors and good internet bandwidth) should be provided in the classrooms' for smooth teaching.
- Laboratories also should be equipped with computers and internet facilities.
- Authorities should motivate teachers for the maximum use of ICT in the classroom.
- University needs to emphasize more on the adoption of ICT amongst the teaching futurity for the teaching process.
- More workshops related to the use and integration of ICT in classroom teaching should be conducted regularly.
- Licensed software to be purchased centrally and related to all the disciplines.
- Training should be given for using smartboards.
- Orientation and workshops should be organized on the use of e-resources.
- Teachers should promote students to participate in an online course provided by the universities. By investing as small as one hour daily in generating ICT can improve teaching very much.

5.4.17 Suggestions for Integration of ICT in Research

- Equipment like computers and the internet should be provided with good quality and quantity to access e-resources.
- A Ph.D. room with few numbers of desktop with internet access should be provided.
- Certain software such as SPSS, SAP, Prism should be provided and training for using this software should be provided. More awareness related to the use of ICT for research work should be created.
- More awareness programmes and seminars on access and use of e-resources of H. M. Library should be carried out.
- Interdisciplinary research should be encouraged.

- Knowledge of mechanisms to avoid plagiarism or such illegal measures must be provided to teachers. More research platforms are made available within the university.
- More e-journals, databases, updated online books, and access to Sci-Finder should be provided to enhance the research work.
- Manuals for how to utilize the different e-resources like e-shodhsindhu, HMT library portal should be provided.
- More training programmes needed regularly and teachers should be sent to relevant training programmes and should be given time to explore the ICT for teaching and research.
- Teachers and students should be trained for using various software ranging from plagiarism, review collection, data analysis, etc.
- Secondary data analysis can be taught by training.
- University research cells should help and support by facilitating frequent demos on e-learning.

5.4.18 Suggestions for Integration of ICT in Administrative Work

- Necessary ICT related equipment needs to be provided in working conditions
- Provide knowledge regarding the use and importance of ICT to people who are engaged in this work with sufficient resources (ICT).
- Paperwork should be lesser
- Teachers should be less involved in administration activities.
- Quite often the web portals do not work efficiently that should be made right.
- making the various activity more online than paper-based such as approvals, applications for day to day needs
- Faculty support staff should also be given adequate training to use ICT and support/facilitation should be provided by the University.
- Keep separate administrative staff and teach them ICT for their admin work. Teachers should not be involved in admin work even if ICT is integrated.
- Complete digitization should be encouraged as many tasks (like applications for requirement) require a soft copy as well as hard copied, which leads to time consumption.

- Certain forms of communication within the administrative frame should be made compulsory using ICT to save time, energy, and paper.
- The non- teaching staff should be more open and well trained to use online / internet technology. They should be trained to efficiently use available computers and online.
- Training and guidance should be given for incorporating ICT in administration to teachers.
- Must have dedicated software and high-speed computer systems for efficient storage of data and easy accessibility upon need and fasten the administration and reducing the usage of papers.
- University should try for online exams like NET, SLET for midterm to reduce papers and time for correction.

5.5 Conclusion

ICT plays an important role in everyday life. The capacity of ICTs to reach students in any place and at any time has the potential to promote revolutionary changes in the traditional educational paradigm. The Indian government and UGC is also promoting ICT by providing various programmes and schemes related to inclusion of ICT in higher education. ICT has the potential to bring the products of the best teachers to classrooms anywhere in the world. ICT can speed the path towards a degree and learning options through self-study. ICTs can become useful tools for the support of teachers. ICT helps teachers to develop or improve lecture plans, exchange ideas, obtain information, and find free animations and simulations to enliven their lectures (Sagar 2007).

Today, a variety of Information and Communication Technology (ICTs) can facilitate not only the delivery of instruction but also the learning process itself. Moreover, ICT can promote international collaboration and networking in education and professional development. There has been increasing evidence that ICT may be able to provide more flexible and effective ways for lifelong professional development for today's teachers (Sagar 2007).

The findings of the present study throw light on ICT usage and its integration by the faculty members in their teaching, research, and administrative work. It is a good

indication that higher percentage of the faculty members had favourable opinions towards ICT. They opined that ICT improves quality of teaching, makes teaching more interesting and effective and helps in producing various teaching materials. The earlier research pointed out that to promote effective integration of ICT into lectures, teachers must have positive attitudes and competency towards the use of ICT in their teaching (Bamigboye, Bankole, Ajiboye, and George, 2013). The finding of the present study highlighted that more number of faculty members were highly and moderately competent in using ICT. They were competent in using basic hardware (like pen drive, hard disk, printer, scanner) and software (like M.S. Word, Power Point). Hence, if they are motivated and encouraged for improving their skills in use of ICT, they were more inclined to have higher usage of ICT in their professional work.

The findings of the present study also indicated that a high majority of faculty members use ICT daily for 2-4 hours. An almost equal number of faculty members were using and integrating ICT into their teaching, research, and administrative work. The findings also indicate that the use of online resources amongst the faculty members was low and they also insisted on training for this. It can be concluded from the findings of the present study that age, discipline, and competency in using ICT positively affected the use and integration of ICT by the faculty members. Hence, it can be expected that if the faculty members were provided with the training in ICT, they were more likely to have higher ICT usage and integration for their professional work. Faculty members integrate ICT more to browse the information for the class, prepare a presentation, refer online journals for their research work, to perform their administrative work.

Faculty members faced the problems of lack of technological infrastructure, lack of training, lack of competency while using and integrating ICT in their professional work. Hence, if the faculty members provided with these facilities they were more likely to have higher ICT usage and integration. Teachers are a key component in the learning environment and therefore the impact of ICT on teachers and the strategies they employ to facilitate the environment are critical (Das, Kharbul, and Rynjah, 2017). The findings of the present study highlighted that ICT raised faculty members work efficiency, their research work becomes faster and easier. They found more influence of ICT on their administrative work than their teaching and research work. The impact of digitalization of administrative work of the university is reflected in this finding.

The suggestions provided by the faculty members highlighted that the university should promote and initiate more training programmes for faculty members. This step for ICT inclusion may lead to the faculty members' empowerment and may uplift their usage of ICT. This ICT inclusion initiative may lead faculty members to integrate it more in their teaching, research, and administrative work. This initiative will also support the efforts made by the government and UGC for the successful integration of ICT in Indian Higher Education.

It is recommended that an enabling environment that will encourage the usage of ICT by faculty members in the university should be created. Faculty members should be encouraged to acquire more ICT skills and knowledge. ICT infrastructure should be provided to meet up with the present educational challenges. Efforts should be made to reduce and suppress the factors that are militating against the usage of ICT in the institution. An efficient and sustainable ICT policy and initiatives that will promote the use and integration of ICT by faculty members should be put in place. Encouraging lecturers to integrate ICT into their professional work may help equip them with the skills and make them literate with the knowledge they require for effective integration of ICT in teaching, research, and administrative work.

5.6 Recommendation for Further Studies

1. A comparative research analysis may be carried out to study the use of ICT by faculty members from various universities.
2. A similar study can be carried out with other private and government universities.
3. Other variables like attitude towards ICT, ICT anxiety, gender, and experience can be studied with similar research objectives.
4. A project can be taken to provide training to faculty members for the use and integration of ICT in teaching, research, and administrative work.
5. Online courses an online workshop can be taken up to provide training to the faculty members related to ICT.
6. A study on ICT usage by university students and administrative staff can be carried out.