CHAPTER 4

FINDINGS AND DISCUSSION

Information and communication technology can facilitate the delivery of instruction as well as the learning process. ICT can promote international collaboration, networking in education, and professional development of the teachers. There is a range of ICT tools –from videoconferencing through multimedia delivery to web sites, which can be used to meet the challenges the higher education system face today. In light of this, the present study was undertaken to explore the use and integration of information and communication technology in higher education. This chapter describes the results based on the data obtained by using quantitative methods of data collection. The findings are reported in the following sections:

4.7.7 Item wise findings for the influence of ICT on the research work of the faculty members

4.7.8 Influence of ICT on the administrative work of the faculty members

4.7.9 Differences in the influence of ICT on the administrative work of the faculty members in relation to selected variables

4.7.10 Item wise findings for the influence of ICT on the administrative work of the faculty members

4.8 Suggestions for the integration of ICT in teaching, research, and administrative work

4.1 Profile of the Faculty Members

Table 20: Frequency and Percentage Distribution of the Faculty Members According to their Background Information

(n=290)

Background Information	Categories	F	%
Age	Young Teachers	101	34.8
	Middle Aged Teachers	91	31.4
	Senior Teachers	98	33.8
Gender	Female	169	58.3
	Male	121	41.7
Designation	Professor	42	14.5
	Associate Professor	25	8.6
	Assistant Professor	84	29.0
	Temporary Assistant Professor	94	32.4
	Temporary Teaching Assistant	45	15.5
Experience in Teaching	0 - 4.9 Years	95	32.8
	5 - 15 Years	108	37.2
	16 - 38 Years	87	30.0
Experience in Research	0 - 2 Years	106	36.6
	3 - 10 Years	115	39.7
	11 - 35 Years	69	23.8

The above table shows that nearly an equal percentage of the faculty members from all the three different age groups constituted the sample of the study. More than one-third of the faculty members were young teachers(34.8%) and senior teachers (33.8%). Middle-aged teachers (31.4%) were also the respondents for the present study. It further provides a picture that as respondents, female faculty members (58.3%) were more in number than male faculty members (41.7%) while undertaking the study. It can be said that female faculty members were more sincere in responding to such queries.

The Maharaja Sayajirao University of Baroda has a total of 1112 teaching staff in the year 2019-20 and out of these 662(59.5%) staff is permanent and 450 (40.4%) is on an ad-hoc basis (www.msubaroda.ac.in). The sample under the study constitutes the respondents who were working temporarily as well as permanent basis. The findings of the study reveal that nearly one-third of the samples were Temporary Assistant Professor (32.4%) and Assistant Professor (29%). Almost equal percent of them were Temporary Teaching Assistant (15.5%) and Professor (14.5%). Very few (8.6%) Associate Professor was the sample for the present study.

The data regarding experience in teaching reflected that a higher percentage of the faculty members (37.2%) had 5-15 years and little less than one-third of them (30%) had 16-38 years of experience in teaching. This shows that the teaching staff of The Maharaja Sayajirao University of Baroda had vast experience in teaching. The faculty members also had extensive experience in research work as nearly forty percent (39.7%) of them had 3-10 years and twenty-three percent of them had 11 -35 years of experience in research.

Figure 2: Percentage Distribution of the Faculty Members According to their Age

(n=290)

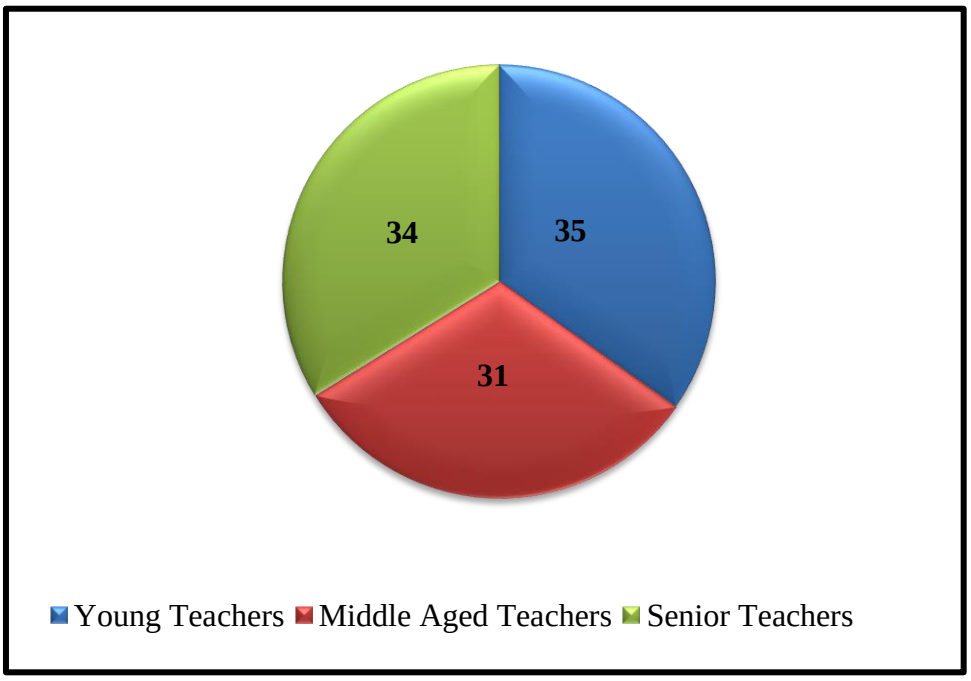


Figure 3: Percentage Distribution of the Faculty Members According to their Gender

(n=290)

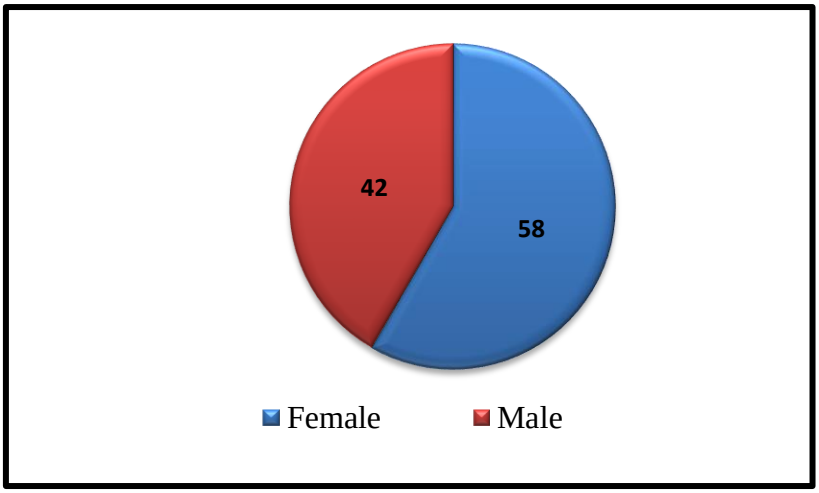


Figure 4: Percentage Distribution of the Faculty Members According to their Designation

(n=290)

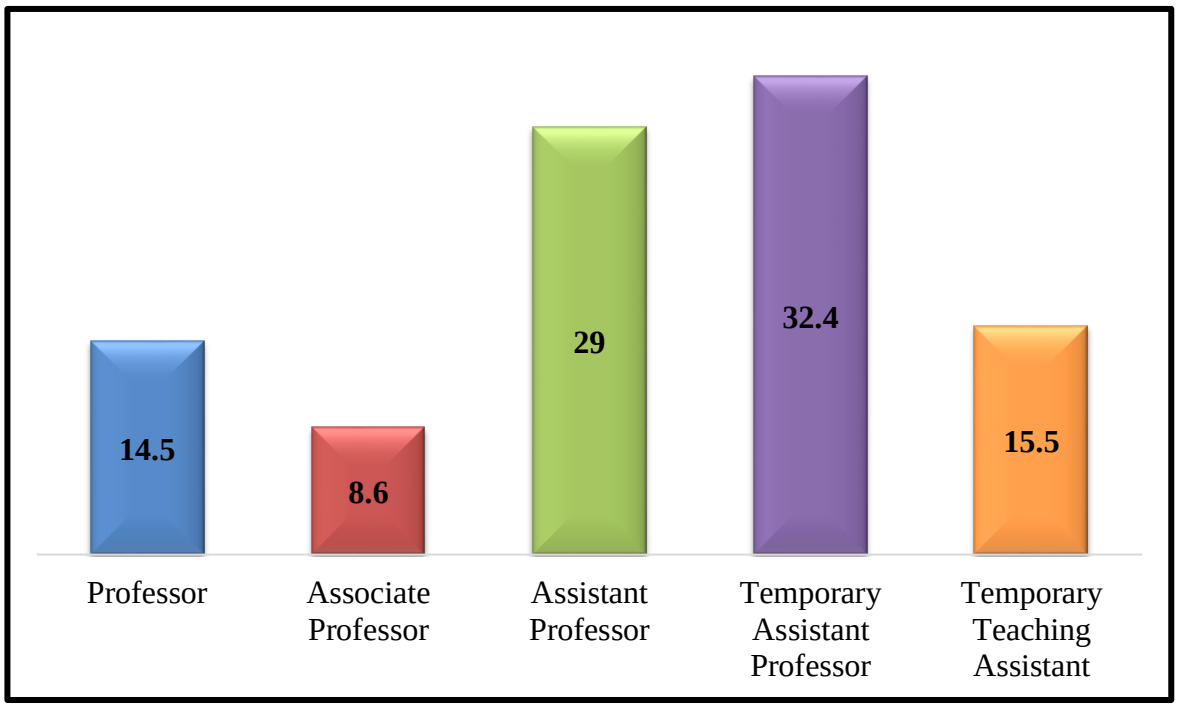


Figure 5: Percentage Distribution of the Faculty Members According to their Years of Experience in Teaching

(n=290)

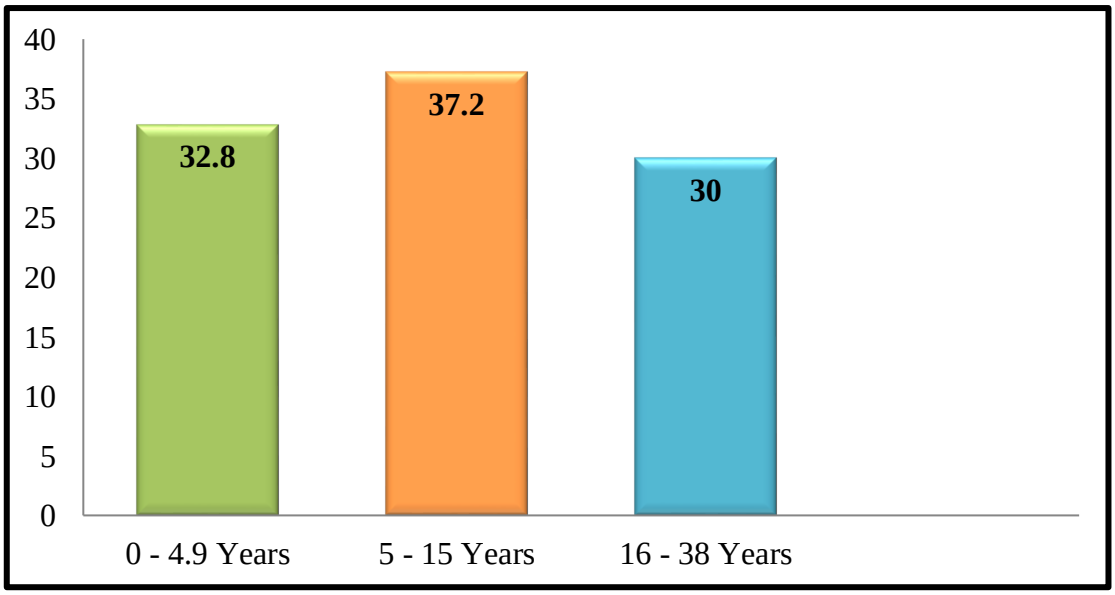


Figure 6: Percentage Distribution of the Faculty Members According to their Years of Experience in Research

(n=290)

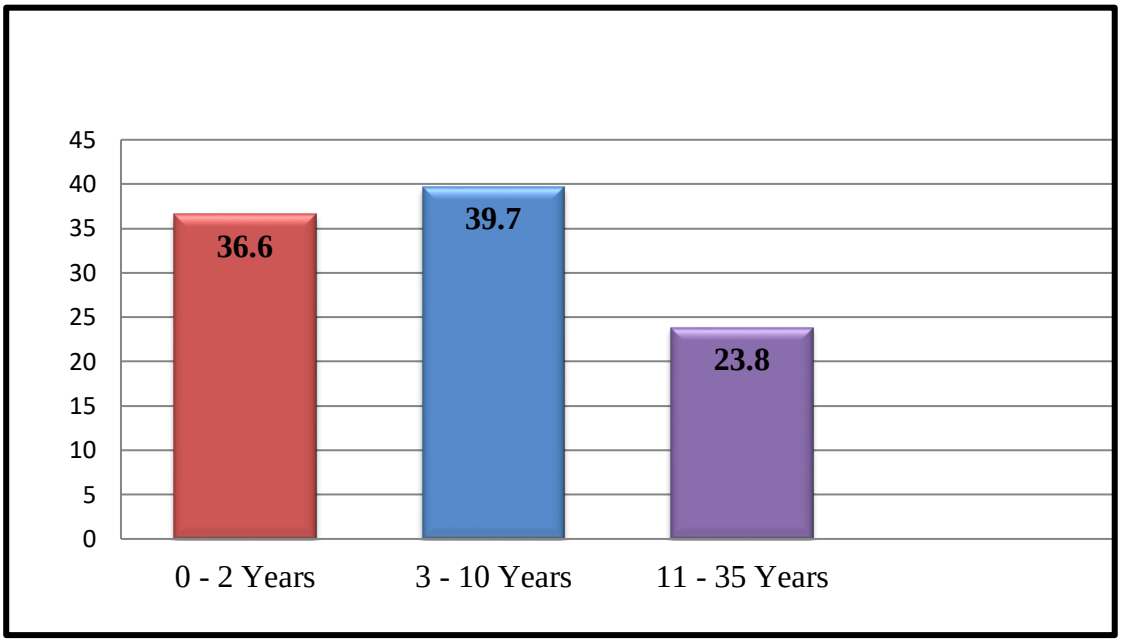


Table 21: Frequency and Percentage Distribution of the Faculty Members According to the Availability of ICT Resources in their Department

(n=290)

ICT Resources	In the Cabin/Staff Room		In the Classroom		In the Common area	
	F	%	F	%	F	%
A desktop computer without an internet connection	58	20.0	26	9.0	61	21.0
A Desktop Computer with an internet connection	186	64.1	41	14.1	130	44.8
Scanner and Printer	144	49.7	19	6.6	118	40.7
Interactive whiteboard	23	7.9	97	33.4	46	15.9
LCD Projectors	24	8.3	171	59.0	81	27.9
Smart TV	6	2.1	19	6.6	22	7.6
University Wi-Fi	202	69.7	189	65.2	193	66.6

*Multiple Choices

One can notice the importance of ICT access during COVID19 when education is dependent on ICT. The frequency of use of ICT is influenced by access to ICT resources. The Maharaja Sayajirao University of Baroda provides a Wi-Fi facility to its staff and students. The majority (69%) of the faculty members reported that they had access to university Wi-Fi on the campus. It is a positive indication that the faculty members reported that a computer with an internet connection (64.1%), scanner and printer (49%) were available in their cabins/staff room. It highlights that teachers are provided with computers, printers, and scanner which are considered important to bare minimum academic activities in the technology-based educational system. 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 probable reason behind this could be that these are very costly tools and mostly used for group communication hence its availability in the personal cabins of teachers is not there. Further, the data reveals that near to majority (59.0%) of the faculty members reported that LCD projectors were available in the classrooms whereas one third (33%) them reported the availability of the interactive whiteboard in the classrooms. Few of them reported that their classrooms had a computer with an internet connection (14.1%), and smart TV (6.6%), a printer with a scanner (6.6%). The data, therefore, reveals that classrooms in the Maharaja Sayajirao University are equipped with technology like computers, LCD projector, and Wi-Fi connectivity (refer figure 7).

The table also indicates that more than forty percent of the faculty members had access to the computer with an internet connection, scanner, and printer in the common area. They also reported the availability of the LCD projector (27.9%), computer without internet connection (21%), and interactive whiteboard (15.9%) in the common area. This finding shows that the faculty members can access the technology in the common area also if they cannot use it in their cabins/staff rooms due to its unavailability. Similar findings were reported by Chisalita and Cretu (2012) in their study. They reported that computers, wireless internet, and ICT laboratories were available on the campus for teachers.

Figure 7: Percentage Distribution of the Faculty Members According to the Availability of ICT Resources in their Department

(n=290)

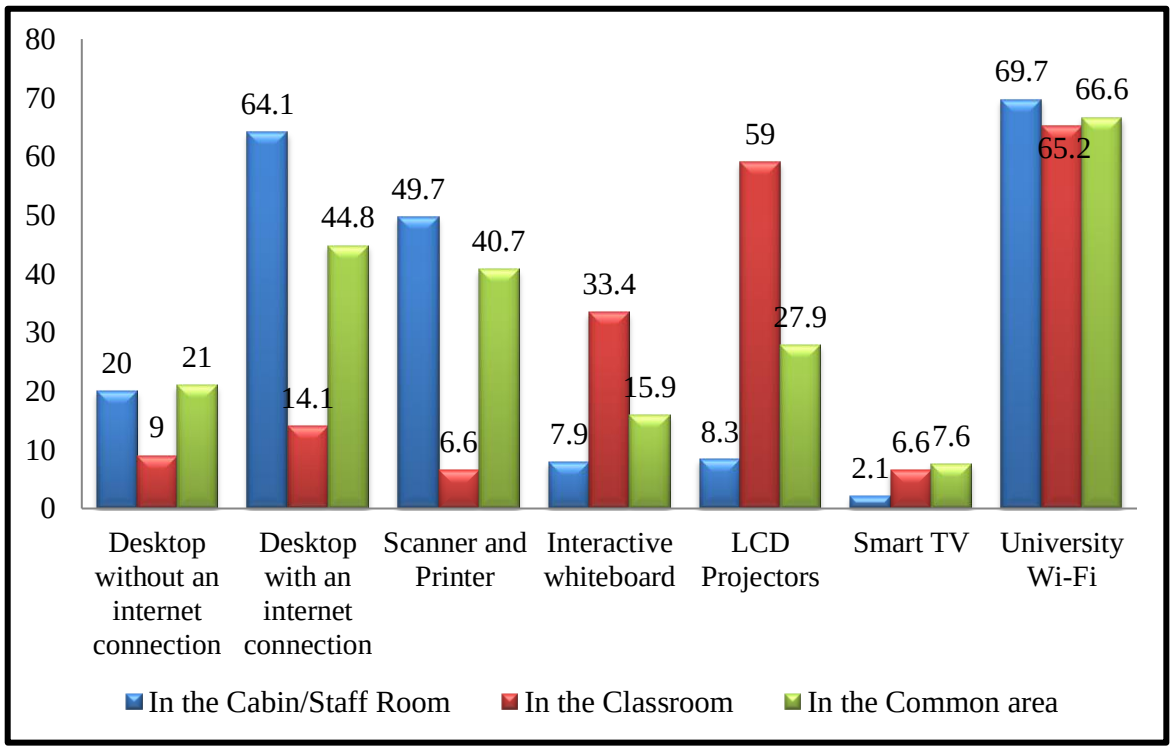


Table 22: Frequency and Percentage Distribution of the Faculty Members According to their Source of Learning Computer and Internet

(n=290)

Source of Learning	Computer		Internet	
	F	%	F	%
Own Self				
Self Instruction	167	57.6	167	57.6
Trial and Error Method	109	37.6	106	36.6
Guidance and Training				
Guidance from colleagues and friends	112	38.6	94	32.4
Training from college	73	25.2	39	13.4
School	3	1.03	3	1.03
Courses				
Online tutorial	79	27.2	82	28.3
Offline courses	65	22.4	55	19.0

*Multiple Choices

Table 22 revealed the data regarding different sources used by the faculty members to learn the computer and the internet. It indicates that less than a majority (57.6%) of the faculty members learned computers and the internet by themselves. The probable reason for this finding could be that the variety of learning material in the form of manual, video, and tutorial guides are available on the internet related to different topics. One can easily understand the use of different software and educational technology through these materials without any one's guidance. The faculty members may have used these materials to learn the technology. This finding aligned with Das, Kharbuli and Rynjah (2017) who also found that majority of the participants acquired knowledge on ICT by self-instruction. Further 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. Colleagues and friends may have more knowledge and skills, so it can be worth to learn those things from them. Two minds are better than one, so working together on technology can be a great way to get to know the new technology and may build a better understanding. Further data indicates that more than one-forth (28%) of the faculty members used online courses as a learning source to learn the computer and the internet which suggests the importance of ICT in technical skills enhancement of the teachers (refer figure 8).

The earlier research indicates that the most popular method of learning the use of the internet amongst the faculty members was through self-instruction. Online instruction and assistant of colleagues and friends were also used by the faculty members to learn the internet. Self or other person assisted training is the mainstay for learning the use of computers and the internet for the faculty members whereas formal training plays a minor role (Ansari, 2006). Mwalongo (2011) in his empirical research also reported that teachers got training of computers from colleges, self-taught, and friends.

Figure 8: Percentage Distribution of the Faculty Members According to their Source of Learning Computer and Internet

(n=290)

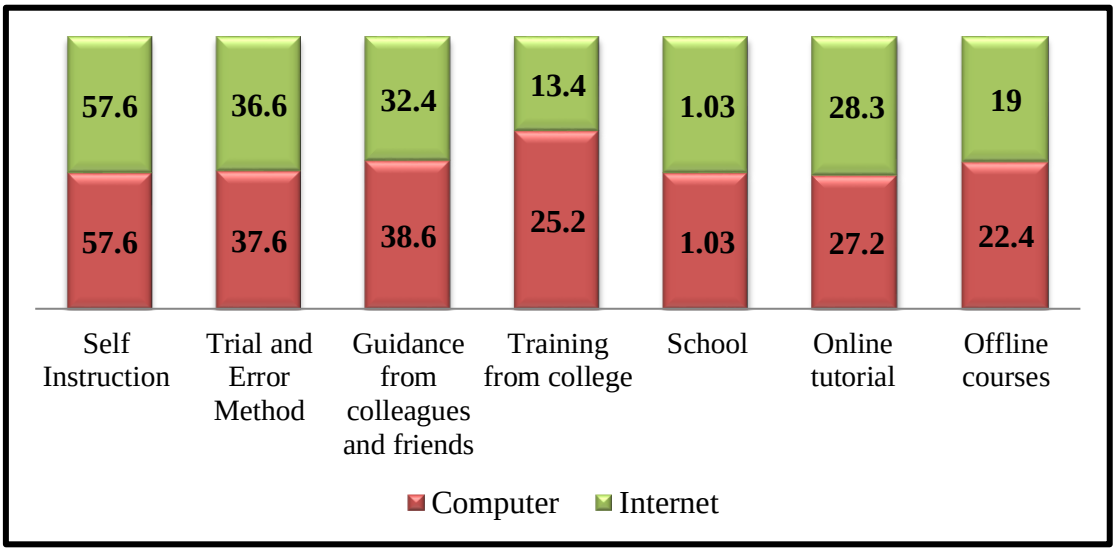


Table 23: Frequency and Percentage Distribution of the Faculty Members According to their attainment of Formal Courses on Computer

(n=290)

Formal Courses	F	%
Not attended	224	77.2
Attended	66	22.8
Total	290	100

The findings of the study revealed that the majority (77.2%) of the faculty members not attended any formal courses related to computers whereas twenty-two percent of the faculty members attended the course on the computer (refer figure number 9). The probable reason could be that majority of the faculty members learned the computer and the internet by own self (refer table no 22) therefore attainment of formal courses may found less amongst the faculty members. Today, on one-click various materials are available on different topics such as the use of software, solving simple technical problems; the use of educational technology and for this formal course completion may not be required. Faculty members may not have an interest in attending such courses or may have anxiety in learning technology and therefore their attainment found less for such courses. A similar finding was also reported by Mwalongo (2011) in his study.

Table 24: Frequency and Percentage Distribution of the Faculty Members According to the Type of Courses attended by them

(n=66)

Type of Course	F	%
Course on Computer Concept (CCC, C++)	30	45.4
Basics of Computer (Paint, M.S.Office, etc.)	20	30.3
Computer Programming	15	22.7
Internet-based course	4	6.0

*Multiple Choices

The able table shows that the faculty members attended the course on computer concepts (45.4%), basics of computer (30.4%), and computer programming (22.7%). According to Gujarat Government GR 2006 on the CCC exam, the government employees need to clear CCC and C++ exam for the appointment and promotion in their jobs. Hence, half of the faculty members may have attended the course on it. This suggests that faculty members may have attended this course due to the job requirement and not for the improvement of skills in using the computer. On the other hand, computer programming is a very specific course with more focus on computer science which may not be required to learn by the faculty members from all the disciplines. The course on the basics of computers includes software like paint, M. S. Office, and internet which are necessary to learn for performing the regular task of teaching, research, and administrative work. These are very helpful tools widely used to organize, manage, and present information, data, and figures (AOLCC, 2016). The previous findings of the present study highlight that a higher percentage of the faculty members learned the internet by themselves (refer table 22) and therefore very few (6%) of them may have attended internet-based courses.

Figure 9: Percentage Distribution of the Faculty Members According to their attainment of Formal Courses on Computer

(n=290)

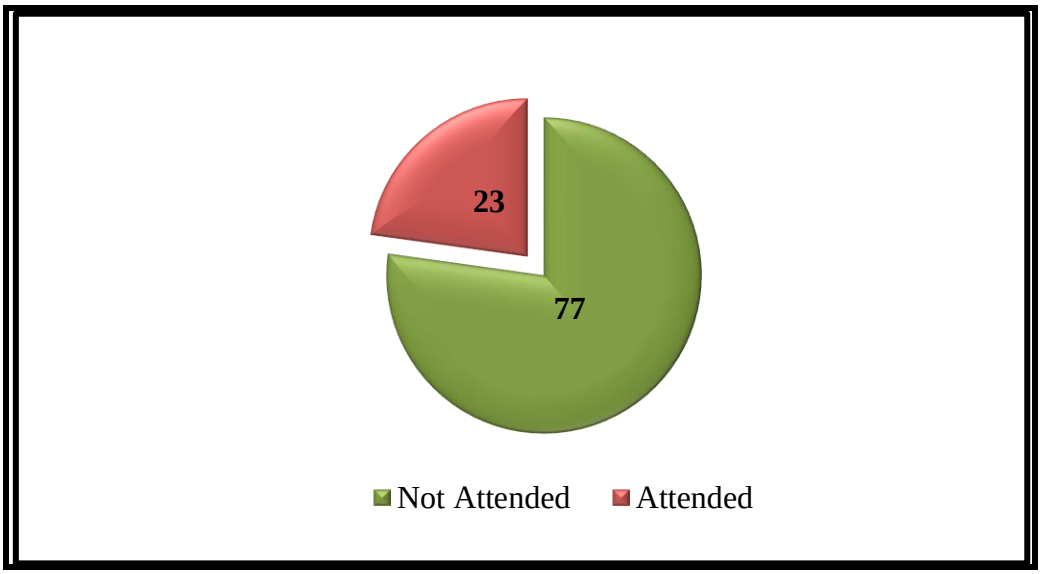


Figure 10: Percentage Distribution of the Faculty Members According to the Type of Formal Courses Attended by them

(n=66)

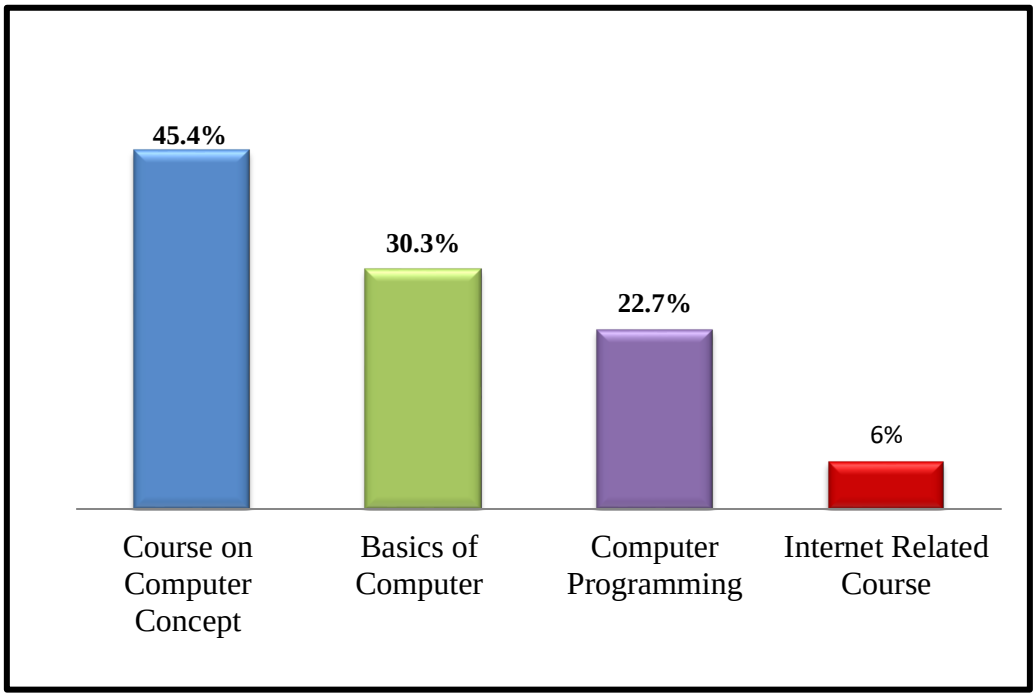


Table 25: Frequency and Percentage Distribution of the Faculty Members According to their Attainment of Training Programme/Workshop on ICT

(n=290)

Attainment of Training Programme/Workshop	F	%
Not Attended	226	77.9
Attended	64	22.1
Total	290	100

The data presented in Table 25 indicates that the majority (77.9%) of the faculty members not attended any training program/workshop on ICT. Faculty members may prefer to attend the training program within the campus, with a short duration. Their busy schedule may not allow them to attend such training programs/ workshops physically at other universities. During COVID 19 various online faculty development programs were organized by different universities which may be feasible for them to attend at their own time, place, and speed. Another reason could be that the university may not be encouraging them to attend such training programs. They may not be interested in attending such training programs as it may not cover the content relevant to their need. They may not understand the importance of ICT in education and the need for training in the use of ICT. Faculty Development Programmes on ICT is organized by the university for its permanent staff and this neglects the skill improvement of the temporary staff. A similar finding was reported by Vajargah, Jahani, and & Azadmanesh (2010) in their study that faculty members make little or less interest in participating in Training Programmes, Workshops, and Seminars related to ICT. Further, the data also reveals that twenty-two percent of the faculty members attended the training program/workshop on ICT. It indicates the efforts made by some of the faculty members for improving their skills in using ICT.

Table 26: Frequency and Percentage Distribution of the Faculty Members According to their Attainment in Type of Training Programme/Workshop/Seminars on ICT

(n=64)

Training Programme/Workshop/Seminar	F	%
Use and Integration of ICT in Education	32	50
Use of E-Resources	15	23.4
Refresher Course in ICT Application	14	21.8
Creating MOOCs (Massive Open Online Course)	6	9.3

*Multiple Choices

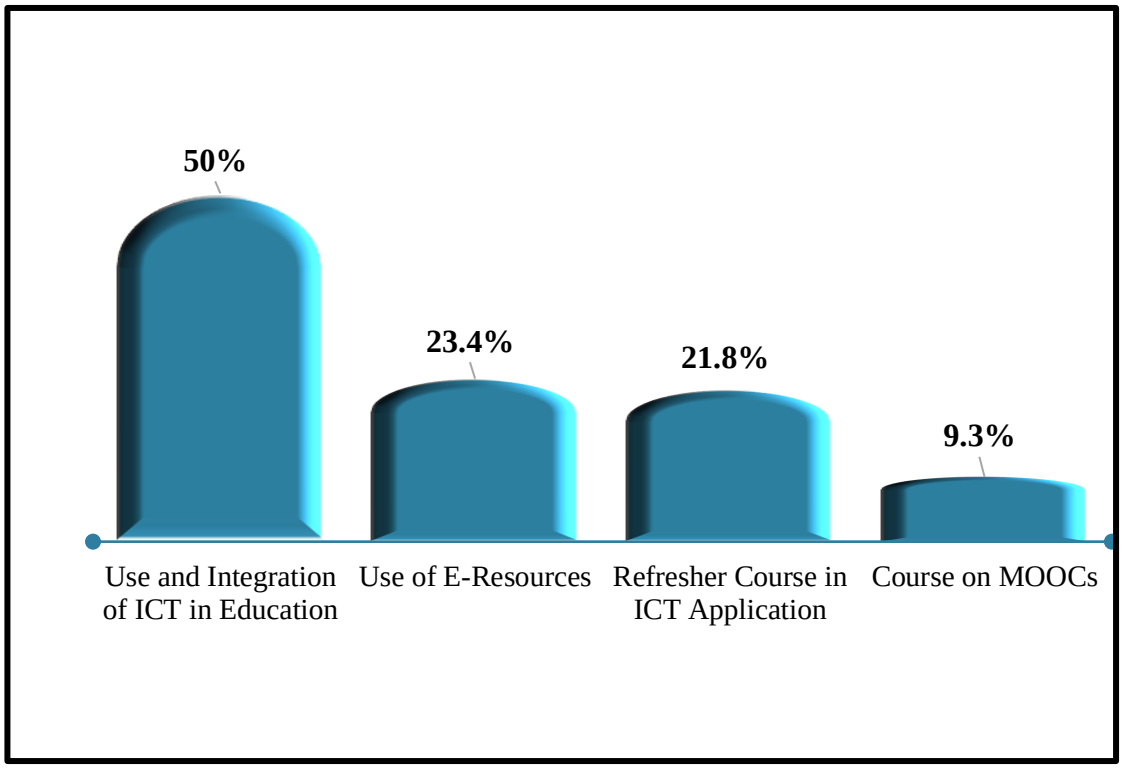
The faculty members' ability and willingness to integrate ICTs into their teaching is largely dependent on the professional training and development that they receive. The above table indicates that half (50%) of the faculty members attended workshops or seminars on the use and integration of ICT in education whereas little more than one fifth (23.4%) of the faculty members attended the workshop on the use of e-resources. These show that faculty members put their efforts to learn new technology. It shows their readiness for learning how effectively ICT can be used and integrated into education. Training programs on the use of ICT in education may cover the content on the use of new technology which they may want to learn. Today all the learning materials are available online, which can be accessed at any time, from anywhere. Through, ICT faculty members can access the online full-text database and virtual libraries. They may feel to improve their skills in accessing materials online and hence their attainment in a training program on the use of e-resources was found. Further, the table also revealed that little more than twenty percent (21.8%) of the faculty members attended the refresher course in ICT application after they were appointed permanent faculty in the University (refer figure number 11).

The development of innovative and effective content in the form of an online course is a necessity for improving access to higher education in India. The government of India and UGC promote the creation of massive open online courses (MOOC), even so very few (9.3%) faculty members attended the training programs/workshops on creating MOOCs. The physical presence of both faculty members and students on the campus

and feasibility of conducting formal teaching-learning may not insist them to create an online course. COVID 19 pandemic forced all the faculty members to learn how to create an online course as they cannot have traditional teaching-learning in lockdown. This crisis must have enforced them to take training in creating MOOC courses.

Figure 11: Percentage Distribution of the Faculty Members According to their Attainment in Type of Training Programme/Workshop/Seminars on ICT

(n=64)



4.2 Usage of ICT by the Faculty Members

4.2.1 Overall usage of ICT by the faculty members

The previous section of this chapter dealt with the profile of the faculty members, availability of ICT related infrastructure in their department, and training they took to learn ICT. The following section deals with the usage of ICT by the faculty members for teaching, research, and administrative work.

Table 27: Frequency and Percentage Distribution of the Faculty Members According to their Use of Desktop/Laptop

(n=290)

Use of Computer/Laptop	F	%
Daily	221	76.2
2 -3 Days a Week	53	18.3
Once in a Week	16	5.5
Total	290	100

The data indicate that the use of computers is high amongst the faculty members of the university. Today the majority of the work related to teaching, research, and administration is done through technology and this may be the reason that majority (76.2%) of the faculty members reported daily use of computers. Another probable reason could be the development of technology and ICT tools in the last few years. Computer technology has the potential to change teachers' teaching methods. Computer technology allows teachers to move from the role of dispenser of knowledge to the facilitator. There is an expansion of the application of computers in education. The low price of hardware and a wide array of computer applications, which are used in education has increased the use of computers in higher education. A similar finding was reported by Lawal and Oloyede (2013) in their study also. They reported that 33% of the lecturers indicated that they use ICT daily.

Further, the data reveal that eighteen percent of the faculty members reported that they were using desktop/laptop within 2-3 days a week whereas very few (5%) of them were using it once in a week. These may be those faculty members who do not have access to desktop in their cabin. They may have access to a common area where they might not get the chance to use and work on it daily.

Figure 12: Percentage Distribution of the Faculty Members According to their Frequency of Using Desktop/Laptop

(n=290)

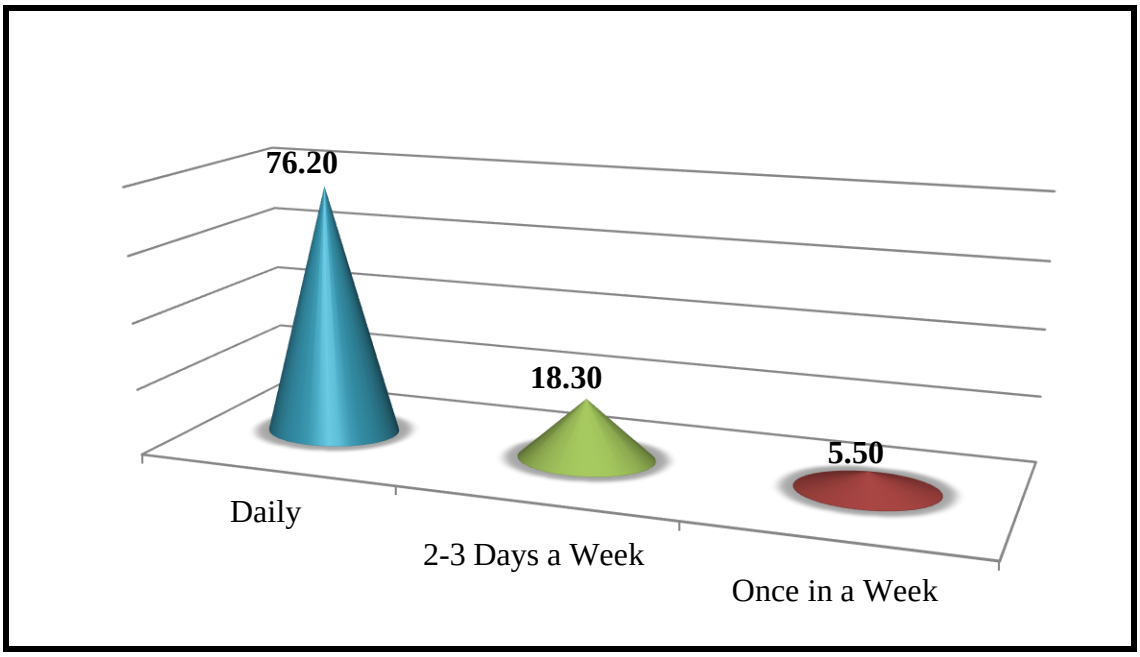


Table 28: Frequency and Percentage Distribution of the Faculty Members According to Time Spent by them on Desktop/Laptop (Without Internet) for their Professional Work

(n=290)

Time Spent Per Day	F	%
Less than 2 Hours	94	32.4
2 – 4 Hours	137	47.2
More than 4 Hours	59	20.3
Total	290	99.9

It is observed from the above table thata higher percentage of the faculty members (47.2%) were spending 2 to 4 hours per day on desktop/laptop for their professional work. It is a positive indication that almost half of the faculty staff spends quite a long time per day on desktop/laptop. It is also evident from the above table that little less than one-third of faculty members (32.4%) spend less than 2 hours whereas twenty percent of them were spending more than 4 hours on computers for their professional work. Computers have changed the way we work, be it any profession. Today, the use

of computers has expanded in the education system as it provides productivity tools such as spreadsheets, databases, word processors to support the professional work of faculty members. Computers are also helpful in administrative and research work carried out by the faculty members. These benefits of the computer must have insisted faculty members to use it for long hours in a day.

Figure 13: Percentage Distribution of the Faculty Members According to Time Spent by them on Desktop/Laptop (Without Internet) for their Professional Work

(n=290)

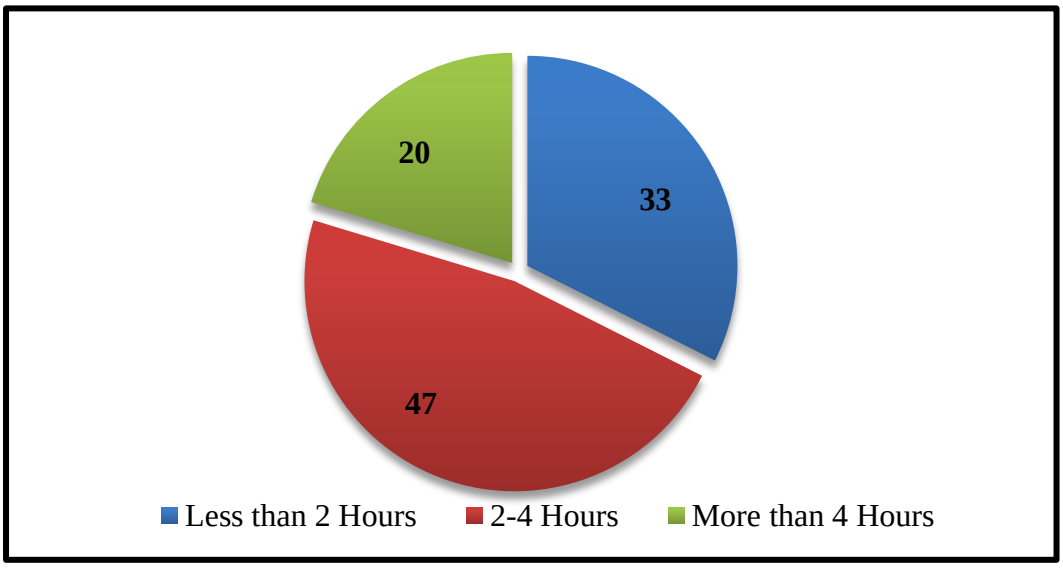


Table 29: Frequency and Percentage Distribution of the Faculty Members According to the Devices Used by them to Access Internet

(n=290)

Device for accessing the internet	F	%
University Wi-Fi	197	67.9
Mobile Data	187	64.5
Broadband	66	22.8
Dongle	36	12.4

* Multiple Choices

The data presented in table 29 revealed that the majority of the faculty members were using University Wi-Fi (67.5%) and mobile date (64.5%) to access the internet on the campus. The probable reason for such a finding could be that the university provides a free Wi-Fi facility to its staff and the majority of the faculty members reported that they

had access to Wi-Fi on the campus (refer table no. 21). Certain websites and e-resources available on the university library portal can be accessed through intranet only and this may demand the use of university Wi-Fi. The expected reason for the high usage of mobile data could be that it can be connected anytime and anywhere with desktop/laptop. Many circulars and important information are circulated through WhatsApp and mobile data is used for accessing such applications. The profile of the faculty member indicates that one-third of them do not have access to a computer with internet connection in the department, so they may need to use mobile data. There are certain corners in the university where Wi-Fi or the internet remains unconnected and this may force them to use mobile data and dongle to access the internet. The findings of the study also reveal that broadband (22.8%) and dongle (12.4%) were also used by faculty members to access the internet on the campus for professional work.

Figure 14: Percentage Distribution of the Faculty Members According to the Devices Used by them to Access Internet

(n=290)

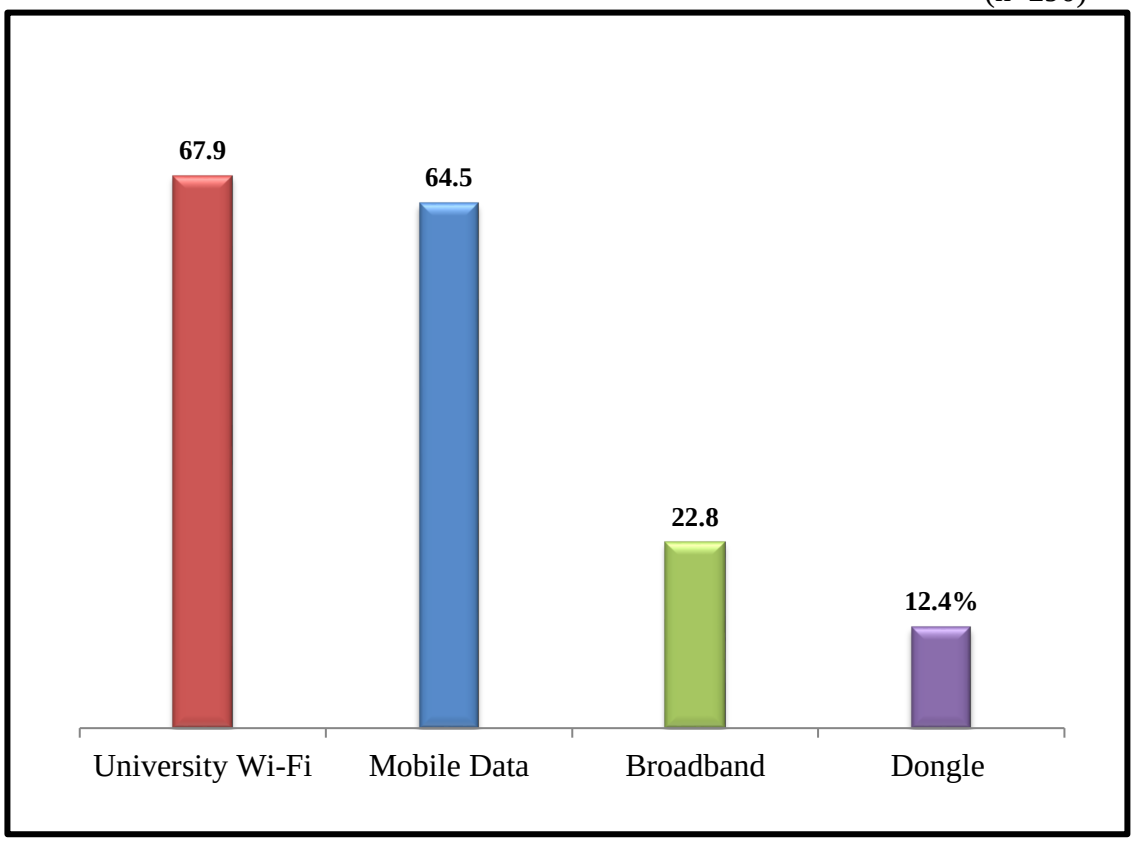


Table 30: Frequency and Percentage Distribution of the Faculty Members According to the Time Spent by them Dailyon the Internet

(n=290)

Time	F	%
More than5 hours	25	8.6
4 to 5 hours	36	12.4
2 to 3 hours	166	57.2
Less than 1 hour	63	21.7
Total	290	99.9

The time spent on the internet by the faculty members for their professional work is presented in table 30. Among the ICTs, the internet has been a single major force of change in higher education and it had gradually become the main vehicle of communication. Today all the teaching and research related resources are available on the internet. Faculty members can also access the resources of other university libraries through the internet. They can contact other university teachers and researchers for their professional work. Faculty members may have registered these benefits of the internet and therefore a higher percentage (57.2%) of the faculty members spent 2 to 3 hours daily on the internet for their professional work. Now day access to the internet also becomes easier through smartphones and search of information, communication with others, sharing of data/information amongst the staff also becomes easier through smartphones. The use of smartphones also accelerated the use of the internet amongst faculty members.

Findings also highlighted that little more than twenty percent (21.7%) of the faculty members spent less than 1 hour whereas eight percent of them spent more than 5 hours on the internet for their professional work. It is clear from the above table that there were teachers who spent more than 5 hours per day on the internet. It shows that now for professional work, the internet is widely used by these faculty members. They must have found multiple uses of the internet. Today, most of the information related to the journal article, seminar/conference, and research projects can be accessed through the internet.

Figure 15: Percentage Distribution of the Faculty Members According to the Time Spent by them Daily on the Internet

(n=290)

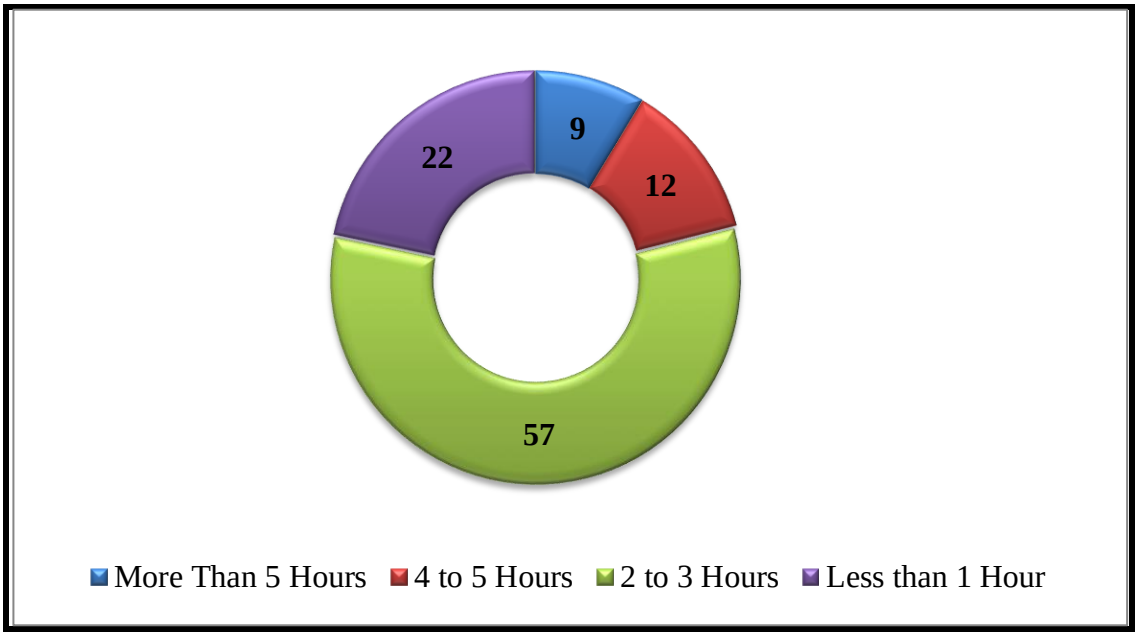


Table 31: Frequency and Percentage Distribution of the Faculty Members According to the Help Required by them to Use ICT

(n=290)

Help	F	%
Not Required	237	81.7
Required	53	18.3
Total	290	99.9

It is a positive indication that a high majority (81.7%) of the faculty members do not require any help to use ICT. It highlights that they may have self-efficiency to use ICT independently. On the other hand, very few (18.3%) of them required help to use ICT. These faculty members may have fear and anxiety in using technology independently. They may not be ready to accept and use new technology in their work. Technical assistance must be available to them in the department whenever they need to use ICT. Faculty members may have less frequent use of ICT and after a time when they use it, they may need help.

Table 32: Frequency and Percentage Distribution of the Faculty Members According to their Use of Computer Accessories

(n=290)

Computer Accessories	F	%
Pen drive	276	95.2
Printer	260	89.7
Scanner	206	71
Hard disk	192	66.2
Mouse pad	169	58.3
Cables and connectors	155	53.4
Speaker	126	43.4
Wireless mouse	125	43.1
Microphone and Headsets	105	36.2
CD copywriter	79	27.2
Joystick & Projector	55	19
Web camera	50	17.2
Digital camera	38	13.1
PC Microphones	34	11.7
Graphic tablet	10	3.4
Gamepad	3	1

*Multiple Choices

Different computer accessories are available to perform different tasks on a computer. Table number 32 highlights the use of computer accessories by faculty members. The result shows that a high majority of the faculty members were using Pen Drive (95.2%), Printer (89.7%), and the majority of them were using Scanner (71%) and Hard Disk (66.2%). This shows that the use of storage and printing devices like Pen Drive, Hard Disk, printer, and the scanner was more amongst the faculty members. Further, the data also reveals that Mouse Pad (58.3%) and Cables Connectors (53.4%) were used by more than half of the faculty members. It is also evident from the above table that equal percent (43%) of the faculty members were using Speakers as well as Wireless Mouse. On the other hand, very few faculty members were using Graphic Tablet (3.4%), PC Microphones (11.7%), and Gamepad (1%).

The above findings indicate that faculty members of the university use different accessories of the computer but the use of basic accessories was more than the advanced accessories. The motive behind this finding could be that basic accessories are easily available and affordable also than advanced accessories. To perform the professional task advanced accessories like a gamepad and graphic tablet may not be required. Faculty members may be competent enough to use basic accessories only and this could also be one of the reasons for more usage of these accessories. Basic accessories are a must, as one cannot operate the computers/internet without this application. The majority of the staff members are provided these basic accessories by the department. Hence, it may be used widely whereas accessories like cameras, gamepads, are the ones that are available in the department as per the requirement or had been purchased under research project grants.

Figure 16: Percentage Distribution of the Faculty Members According to their Use of Computer Accessories

(n=290)

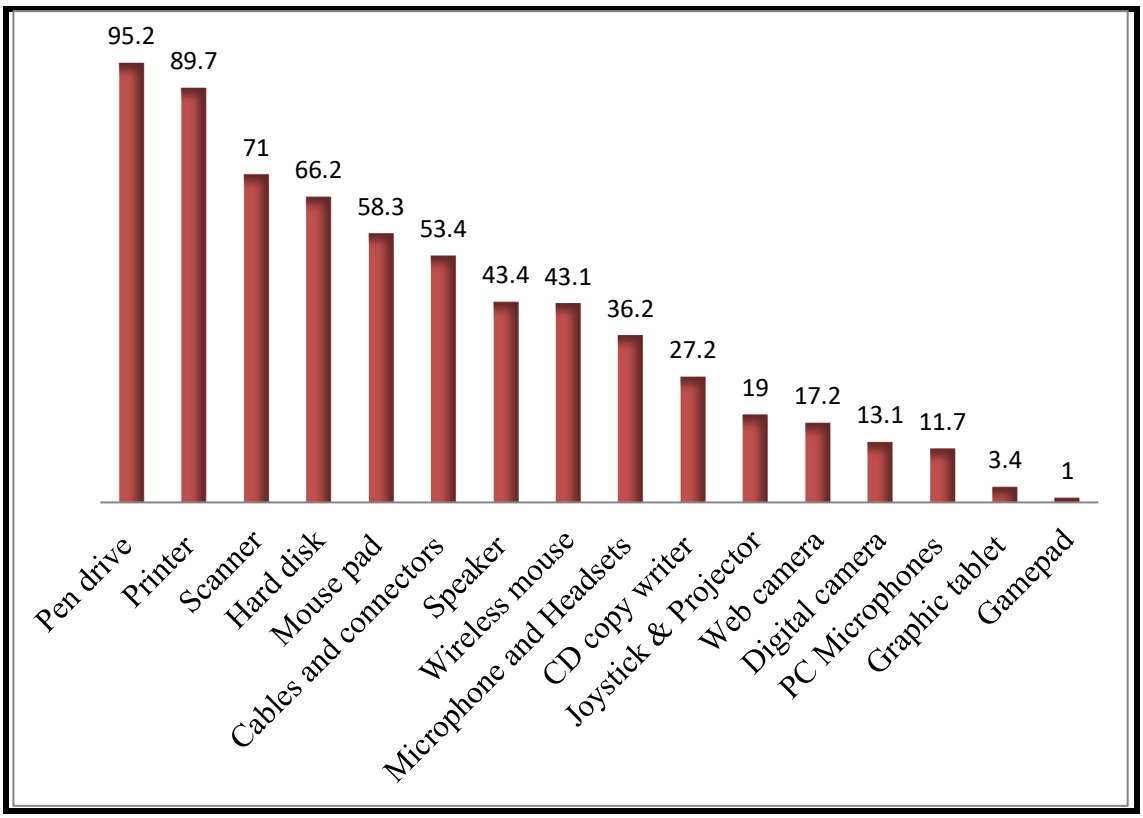


Table 33: Percentage Distribution of the Faculty Members According to their Use of E-Resources for Teaching and Research Work

(n=290)

E-Resources	Teaching			Research		
	M	S	R/N	M	S	R/N
J-Gate	9.3	10.7	80.0	13.1	11.7	75.2
Organization for Economic Cooperation and Development (OECD) Library	4.1	7.2	88.6	4.8	9.7	85.5
World Bank Open Data	5.2	9.3	85.5	7.2	9.3	83.4
International Monitory Fund (IMF) e-library	2.4	10.0	87.6	2.4	11.0	86.6
ProQuest Dissertations and Theses (PQDT)	5.9	12.8	81.4	7.9	14.8	77.2
Global Periodicals	4.5	14.1	81.4	5.5	14.5	80.0
Science Magazine	8.3	21.4	70.3	10.7	16.6	72.8
World e-book library	9.0	18.3	72.8	10.0	12.1	77.9
South Asia Archive	4.5	8.3	87.2	4.5	9.3	86.2
e-shodhsindhu	13.8	16.2	70.0	16.9	15.2	67.9
Open Knowledge Gateway (OKG)	6.6	16.6	76.9	10.3	11.4	78.3
Virtual Library	7.6	16.6	75.9	9.0	12.4	78.6
Open Archives	10.3	13.4	76.2	11.7	12.1	76.2
E-Newspaper/ magazines/ books/ journals	24.1	29.0	46.9	25.2	21.0	53.8

The Hansa Mehta Library of the University provides free access to different e-resources through its portal to university staff and students. Despite the free access of the e-resources, the data presented in table number 33 indicated low use of e-resources by the faculty members. A high majority of the faculty members were rarely/never used the resources available on Hansa Mehta Library Portal. More than one-fourth of the faculty members were usinge-newspaper/magazines/books/journals sometimes for teaching (29%) and most of the time for research work (25.2%).Science Magazines were used sometimes for teaching (21.4%) and research work (16.6%) by the faculty members.

More than fifteen percent of the faculty members were using e-shodhsindhu (16.2%), Open –Knowledge Gateway (16.6%), and virtual library (16.6%) sometimes for teaching. J-gate (13.1%), e-shodhsindhu (16.9%), and Open Archives (11.7%) were used by them most of the time for research work.

Many online resources required paid subscription and university library provide the facility of free access to these resources than also the findings show low use of these resources amongst the faculty members. The above electronic resources can be accessed through the intranet and faculty members can access it on the campus only. For these, they may need to sit and work on the campus for long hours. Faculty members may prefer to access the material through the traditional method of visiting the library physically. They were not trained in accessing the material online and they may be unaware of these resources. Access to these materials is a little complicated and these could be another reason for the low usage of electronic resources. They might be facing a problem in searching for materials relevant to their subjects from the huge database. University may not be encouraging faculty members to use these materials. These all could be the possible reasons for the low usage of e-resources amongst the faculty members.

The contradictory finding was reported in the study carried out by Sharma (2009) on the use of e-resources. He found in his study that the majority of the teachers and research scholars were using the library web site as a gateway to access the electronic sources.

Table 34: Percentage Distribution of the Faculty Members According to their Use of ICT Resources in Teaching, Research, and Administration Work

(n=290)

ICT Resources	Teaching			Research			Administration		
	M	S	R	M	S	R	M	S	R
Hardware									
Desktop	44.5	19.7	35.9	41.0	19.0	40.0	45.9	21.7	32.4
Laptop	49.7	26.6	23.8	49.7	19.3	31.0	36.6	21.7	41.7
LCD	22.1	24.8	53.1	11.0	11.7	77.2	10.3	7.6	82.1
Smart Boards	9.3	8.6	82.1	4.5	3.8	91.7	4.1	2.1	93.8
Smart TV	2.8	4.8	92.4	2.4	2.8	94.8	4.1	3.1	92.8
Scanner and printer	37.6	31.0	31.4	36.2	26.9	36.9	40.0	23.1	36.9
Software									
Word	60.0	23.1	16.9	55.5	17.6	26.9	44.5	20.0	35.5
Excel	46.9	19.0	34.1	44.1	14.8	41.0	37.9	11.4	50.7
PowerPoint	56.9	21.7	21.4	45.5	19.0	35.5	26.9	10.7	62.4
Access	10.3	8.6	81.0	9.0	7.9	83.1	5.5	3.1	91.4
LaTax	4.5	3.8	91.7	8.3	7.2	84.5	1.7	2.1	96.2
Prezi	0.7	1.4	97.9	2.8	4.5	92.8	1.0	1.4	97.6
SPSS	5.2	4.8	90.0	12.8	9.0	78.3	3.4	2.1	94.5
Corel Draw	5.5	5.5	89.0	6.2	3.8	90.0	3.1	1.4	95.5
Auto CAD	6.9	6.9	86.2	4.5	6.6	89.0	2.1	3.1	94.8
Photoshop	7.6	8.6	83.8	6.2	5.2	88.6	3.4	2.8	93.8
Flash	4.8	2.8	92.4	4.1	2.4	93.4	2.1	1.0	96.9

The data presented in Table 34 indicates the use of different hardware and software by the faculty members in teaching, research, and administrative work. Desktop and laptop were used most of the time by a higher percentage of the faculty members for teaching, research, and administrative work. Desktop and laptop are basic ICT tools without which digital work can not be possible. They are required for preparing and presenting material for the class, preparing official documents, for students' management, accessing information, and storing the data. University also encourages paperless work

which may force more use of desktop and laptop amongst the faculty members. Further, the data reflects that almost forty percent of the faculty members were using a scanner and printer most of the time in their professional work. LCD projector was used sometimes (24%) by the faculty members for teaching than the research and administrative work. The findings of the study indicate that a high majority of the faculty members rarely or never used smart boards and smart TV for any professional work.

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. Earlier research also highlighted that faculty members make the use of PowerPoint in their class teaching (Sharma, 2009). A similar finding was also found in the study carried out by Gazi and Arikan (2015), Lawal and Oloyede (2013), Peeraer, and Petegem (2010), Adegun, Akomolafe and Adesua (2013). The findings of the present study indicate that near to half (46.9%) of the faculty members were using Excel for teaching most of the time. A high majority of the faculty members were rarely or never used software such as Access, LaTax, Prezi, SPSS, Corel Draw, Auto CAD, Photoshop, and Flash.

This shows that the use of the M. S. Office was more amongst the faculty members than the other software. The probable reason could be that it is very common and easy to use. Faculty members may feel more comfortable using this software than the other software. One more reason could be that other software needs some training whereas this can be learned by one owns self. Profile of the faculty members indicates that many of them took the training in basics of computer and refresher courses in ICT and these courses cover the M. S. Office. Drawing software may not be useful to all the faculty members belonging to different disciplines like Arts, Performing Arts, and Social Science.

Table 35: Percentage Distribution of the Faculty Members According to their Usage of Service

(n=290)

Services	Teaching			Research			Administration		
	M	**S**	**R**	**M**	**S**	**R**	**M**	**S**	**R**
University Wi-Fi	46.9	15.9	37.2	35.5	16.6	47.9	37.9	14.1	47.9
University Website	24.1	27.2	48.6	16.6	19.3	64.1	26.6	19.0	54.5
Hansa Mehta Library Portal	12.1	26.9	61.0	17.9	20.0	62.1	4.5	9.7	85.9

The data reveals that the use of services provided by the university also varies amongst the faculty members. More than forty percent of the faculty members were using university Wi-Fi for teaching (46.9%) and administrative work. The above table also indicates that more than one forth and of the faculty members were using the university website (26.6%) for administrative work and teaching (24.1%). As discussed in table number 36 the use of Hansa Mehta Library portal amongst the majority of the faculty members was found rarely/never and the similar finding inferred from the above table also.

Table 36: Percentage Distribution of the Faculty Members According to their Use of Internet-Based ICT Resources (n=290)

ICT Resources	Teaching			Research		
	M	S	R	M	S	R
Information Resources						
Webgraphy						
Online journal articles	27.2	28.3	44.5	42.1	15.9	42.1
Conference papers	22.4	26.6	51.0	34.8	18.6	46.6
Documents produced by institutions	15.9	21.4	62.8	21.4	16.6	62.1
E-books	34.1	31.4	34.5	39.3	23.8	36.9
E-journals	30.7	27.6	41.7	44.8	19.0	36.2
Virtual Encyclopedias						
Wikipedia	31.4	26.2	42.4	24.8	20.3	54.8
Wikiversity	11.0	11.0	77.9	11.0	9.7	79.3
WikiEducator	9.3	11.0	79.7	9.3	9.0	81.7
Online Database	13.8	16.9	69.3	14.8	14.1	71.0
Web 2.0 Tools						
Social bookmarks	8.3	11.4	80.3	6.9	9.3	83.8
YouTube	29.3	38.3	32.4	23.8	26.6	49.7
Slide share	21.7	25.9	52.4	16.6	20.7	62.8
Teacher Tube	4.8	13.1	82.1	4.8	9.0	86.2
Collaborative Resources						
Distribution list (Google groups)	11.4	15.5	73.1	11.0	17.2	71.7
Collaborative groups (research gate, academia.edu)	14.1	16.2	69.7	19.7	22.8	57.6
Blogs	19.7	22.8	57.6	6.6	14.1	79.3
Seminar on the web (Webinar)	8.3	20.3	71.4	8.6	17.9	73.4
Virtual Communities(LinkedIn)	7.2	15.9	76.9	10.3	19.0	70.7
Learning Resources						
Repositories(educational resources)	10.0	19.0	71.0	9.7	13.1	77.2
Online questionnaire	5.2	19.7	75.2	8.6	17.2	74.1
Audio classes (podcast)	5.5	16.2	78.3	4.1	12.4	83.4
Open Course Ware (online courses)	8.3	11.0	80.7	7.9	9.0	83.1
Reference managing and data storage Software						
Google Drive	41.7	23.8	34.5	40.0	16.6	43.4
Zotero	2.1	6.9	91.0	2.1	3.4	94.5
Dropbox	10.3	14.8	74.8	7.6	10.3	82.1
EndNote	3.1	7.6	89.3	3.4	4.1	92.4
Mendeley	5.5	6.9	87.6	6.9	6.2	86.9
Evernote	2.1	5.2	92.8	2.8	2.4	94.8
Refseek	1.4	2.4	96.2	0.7	1.7	97.6

The use of internet-based ICT resources is discussed in table 35. It is quite surprising that a high majority of the faculty members rarely/never used internet-based ICT resources. A higher percentage of the faculty members were using e-journals (44%), online journal articles (42%), and e-books (39.3%) 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. Academic online journals, books come with several research options, which helps widen researcher scope. They also allow the researcher to explore both quantitative and qualitative research for optimum results. Therefore maybe the use of these resources was found more for research work than the teaching. Findings reported in the study carried out by Egberongbe (2011) also support the present findings. He found in his study the heavy usage of popular and well-known resources (e-journals, e-books) by the faculty members and the research scholars.

The findings also reveal that faculty members used Wikipedia more than the other virtual encyclopedias for teaching and research work. A higher percentage of the faculty members were using Wikipedia most of the time for teaching than research. The present finding was supported by the results found by Sharma (2009) in his study where he found more use of Science Direct, Springer Link, and Wikipedia. More faculty members were using online databases most of the time for research work than teaching which shows the relevance of ICT in the field of research. The data indicates that nearly forty percent of the faculty members were using YouTube sometimes whereas one fourth (25%) of them were using slide share some times for teaching purposes. YouTube and slide share make the teaching more effective due to its audio-visual characteristics. The findings was consisted with the results of Soetan and Coker (2018) who found that lectures do engage in straming activities using YouTube which has the highest mean. They accessed and shared information through slideshare.

The data related to collaborative resources indicates that equal percent (22%) of the faculty members were using collaborative groups some times for research work and blogs sometimes for teaching purposes. Near to twenty percent of the faculty members were using webinar sometime (20.3%) for teaching and research work (17.9%). They may prefer to physically attend the seminar/workshops but during COVID-19 these programs have come to a standstill. Faculty members are now encouraged to participate in the programs organized via webinar according to their subjects and choice. For a

person who beliefs in the face to face training program may find it less attractive since webinar is a new concept. Further, the data presented in the above table reflects that more number of faculty members were using all learning resources some times for teaching purpose than research work. 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. Earlier research also highlighted that professors do not use Reference Managing Software at all when the academic library at Tallinn University provides support to RefWorks (Francese, 2011).

Table 37: Frequency and Percentage Distribution of the Faculty Members According to their Overall Usage of ICT

(n=290)

ICT Usage	F	%
High Usage	97	33.4
Moderate Usage	97	33.4
Low Usage	96	33.1
Total	290	99.9

Table 37 presents the frequency and percentage for the overall usage of ICT amongst the faculty members. It shows that equal percent (33%) of the faculty members had high, moderate, and low ICT usage. The usage of ICT was found amongst the faculty members. The possible reason for such a finding could be that there were faculty members who were using ICT regularly and as well as weekly also. Some faculty members use ICT regularly as their subjects are such which may allow them to use it at a maximum level such as Science and Technology. On the other hand disciplines like Performing Arts, and Fine Arts may have more practical with hand-on work experiences and therefore the use of technology may found less amongst them. Another expected reason could be that provision of technical resources differs from department to department. Faculty members' skills and ICT knowledge also differ and this could also be the reason for high, moderate, and low usage of ICT by them.

As the data was collected before COVID 19, faculty members and students were physically present on the campus and meeting everyday whereas during the crisis they cannot meet personally and have to use ICT for performing their teaching-learning task. So, it indicates that before COVID 19 faculty members were using ICT to supplement their work as there was no compulsion to use it for teaching-learning. A contradictory finding was found in a survey carried out by Fofanah (2018) that the use of ICT tools for academic work among teaching staff was very high (87%). Another researcher also reported contradictory findings in his study (Opati, 2013). His sample of the study reported high usage of ICTs as instructional artifacts. Soetan and Cokern (2018) in their study infereed that lecturers do access technologies, however use it relatively at a low extent.

Figure 17: Percentage Distribution of the Faculty Members According to their Overall Usage of ICT

(n=290)

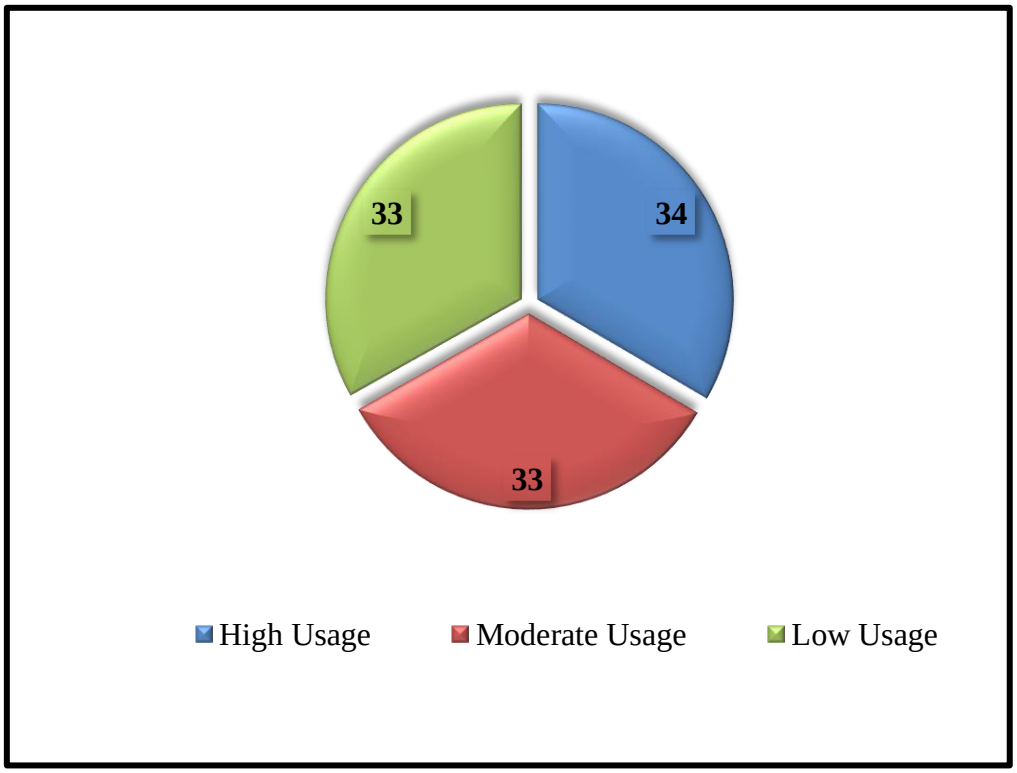


Table 38: Frequency and Percentage of the Faculty Members According to their Use of ICT in Relation to Selected Variables

(n=290)

Variables	n	Usage of ICT					
		Low		Moderate		High	
		F	%	F	%	F	%
Age							
Young Teachers	101	28	27.72	29	28.71	44	43.56
Middle Aged Teachers	91	30	32.96	30	32.96	31	34.06
Senior Teachers	98	38	38.77	39	39.79	21	21.42
Discipline							
Science and Technology	136	45	33.1	51	37.5	40	29.4
Humanities	106	47	44.3	34	32.1	25	23.6
Social Science	48	5	10.4	12	25.0	31	64.6
Designation							
Temporary Teaching Assistant	45	15	33.3	12	26.6	18	40
Temporary Assistant Professor	94	30	31.91	28	29.78	36	38.29
Assistant Professor	84	26	30.95	32	38.09	26	30.95
Associate Professor	25	9	36	11	44	5	20
Professor	42	17	40.47	14	33.33	11	26.19
Competency in Using ICT							
Less Competent	104	46	44.23	27	26.74	31	29.80
Moderately Competent	90	22	24.44	36	39.13	32	35.55
Highly Competent	96	28	29.16	34	35.42	34	35.42
Opinions towards ICT							
Favorable	157	56	35.66	56	35.66	45	28.66
Unfavorable	133	41	30.82	41	30.82	51	38.34
Technological Infrastructure							
Good	144	30	20.8	47	32.6	67	46.5
Poor	146	67	45.9	50	34.2	29	19.9

The data presented in Table 40 indicates that a higher percentage of the following faculty members had higher usage of ICTs:

- Young teachers
- Teachers form Social Science discipline
- Temporary Assistant Professor
- Those having unfavorable opinions towards ICT
- Those having the good technological infrastructure in the department.

A higher percentage of the following faculty members had a moderate level of ICT usage:

- Those were seniors
- Belonging to Science and Technology discipline
- Associate Professors
- Having moderate competency in using ICT
- Favorable opinions towards ICTs
- Those having poor technological infrastructure facilities in the department.

The above table also highlights that young teachers from the social science discipline had high usage of ICT than their counterparts. Designation and competency wise Temporary Teaching Assistant, Temporary Assistant Professor, highly and moderately competent faculty members had high usage of ICT than their fellow faculty members. High usage of ICT was found amongst the faculty members who had unfavourable opinions towards ICT and good technological infrastructure in their department than their peer group.

4.2.2 Differences in the Overall Usage of ICT by the Faculty Members in Relation to the Selected Variables

The extent of usage of ICT by the faculty members was discussed concerning selected variables. It would be now interesting to know if it varies concerning the variables selected for the study. The survey reveals interesting and useful findings to help the analysis of the reasons for variance in the usage of ICT in relation to selected variables.

Table 39: Differences Calculated through t-ratio of the Usage of ICT by the Faculty Members in Relation to Selected Variables

(n=290)

Variables	Categories	N	Mean	S.D.	t – Value
Opinions towards ICT	Favourable	157	220.39	42.08	- 0.95
	Unfavourable	133	225.01	40.09	
Technological Infrastructure	Good	144	236.19	43.10	-5.92**
	Poor	146	209.01	34.62	

*Significant at 0.01 level

It can be seen from table 38 that concerning faculty members' opinions towards ICT there was no significant difference in the overall usage of ICT. It indicates that a difference in the opinions of the faculty members towards ICT does not affect their usage of ICT. Certain academic activities such as online admission, filling of annual report/self-appraisal, preparing documents on the computer, communication with colleagues, and other researchers may force the faculty members to use ICT compulsory. They also have to perform certain administrative duties such as time-table in charge, dean of students/sports, directors of institutes, convenor of different committees. To perform all the above tasks and roles they may have to use ICT whether they have favourable or unfavourable opinions towards ICT. Hence, differences in their opinions towards ICT have not found an effect on their usage of ICT. Thus, the null hypothesis stating that there will be no significant difference in the usage of ICT in relation to their opinions towards ICT was accepted. The contradictory finding was found by Tyagi (2012) in his study on the adoption of Web 2.0 tools. He found that the faculty members' opinions, attitude and their perceived behavioural control are strong predictors to their intension to use Web 2.0 technologies.

The table further indicates that in relation to technological infrastructure there was a significant difference. The difference was found between poor infrastructure and good infrastructure. It reveals that the faculty members with good technological infrastructure had more usage of ICT. Ali, Haolader, and Muhammad (2013) in their study concluded that access to ICT infrastructure and resources in university is necessary for the use of ICT in education. Effective use of ICT in the education system depends on the availability and accessibility of ICT resources such as hardware and

software. The findings of the present study also observed a similar trend. Thus, the null hypothesis stating that there will be no significant difference in the usage of ICT in relation to technological infrastructure was not accepted. A contradictory finding was also found by Peeraer and Petegem (2010) in their study that access to technology is not a barrier to the use of ICT for teaching practice. Personal access to a computer in the institute results in lower use of ICT for teaching practice.

Table 40: Analysis of Variance (ANOVA) Indicating Usage of ICT by Faculty Members in Relation to Selected Variables

(n=290)

Variables	Source of Variance	DF	Sum of Square	Mean Square	F Value	Sig.
Discipline	Between Groups	2	52355.490	26177.745	17.05*	0.01
	Within Groups	287	440676.979	1535.460		
Age	Between Groups	2	14697.162	7348.581	4.40*	0.01
	Within Groups	287	478335.307	1666.674		
Designation	Between Groups	2	5751.231	1437.808	0.84	0.50
	Within Groups	287	487281.238	1709.759		
Competency in Using ICT	Between Groups	2	78123.818	39061.909	27.02*	.000
	Within Groups	287	414908.651	1445.675		
Problems in Use of ICT	Between Groups	2	5042.84	2521.42	1.48	0.23
	Within Groups	287	487989.63	1700.31		
Integration of ICT	Between Groups	2	98628.18	49314.09	35.89*	0.01
	Within Groups	287	394404.29	1374.23		
Influence of ICT	Between Groups	2	41991.60	20995.80	13.36*	0.01
	Within Groups	287	451040.87	1571.57		

*Significant at 0.01

Table 40 reveals that there was no significant difference found in the overall usage of ICT in relation to the designation of the faculty members and problems faced in the use of ICT. The earlier study also indicates that there is no significant difference with designation wise using various ICT applications (Sivakami and Rajendran, 2016). Therefore, the null hypothesis stating that there will be no significant difference in the

usage of ICT in relation to designation and problems faced in the use of ICT was accepted.

There was a significant difference in the usage of ICT concerning the discipline, age, competency in using ICT, integration of ICT, and the influence of ICT. To know which group's ICT usage differs significantly the data were further analyzed through post – hoc test.

Table 41: Tukey's HSD Comparison for Usage of ICT by Faculty Members in Relation to Selected Variables

Variable	I	Mean (I)	J	Mean (J)	Mean DF (I – J)	SE	Sig.
Discipline	Social Science	251.27	Science and Technology	220.73	30.54*	6.579	.001
			Humanities	211.77	39.50*	6.817	.001
Age	Young	230.74	Senior	213.57	17.17*	5.789	.001
Competency in Using ICT	Moderately	231.41	Less	200.82	30.60*	5.474	.001
	Highly	237.67			36.85*	5.381	.001
Integration of ICT	High	243.60	Moderate	226.67	16.93**	5.41	0.05
			Low	199.25	44.35*	5.30	0.01
	Moderate	226.67			27.42*	5.30	0.01
Influence of ICT	Moderate	226.15	Less	207.09	19.06**	5.60	0.02
	High	236.02			28.93*	5.73	0.01

*Significant at 0.01, ** Significant at 0.05

Lubis, Syed, and Sarji (2017) in their empirical study concluded that lecturers' department origin has a difference in ICT usage. The data presented in the above table also shows that faculty members belonging from the Social Science discipline had more usage of ICT than faculty members from Science and Technology as well as from Humanities. This is a surprising finding that faculty members belonging to Science and Technology had less usage than Social Science. The use of ICT may make social science subjects more appealing subjects. To provide better support for the social

science field, faculty members belonging from this discipline may be using ICT. Chowdhury (2009) also reported significant differences across discipline with the use of ICT in the classroom. Onasanya, Shelhu, Oduwaiye and Shehu (2010) reported no significant difference between Science and Science related lecturers' willingness to use ICT facilities for teaching, learning and research in tertiary institution.

Further, the data reveals that faculty members belonging to the young age group had more usage of ICT than senior teachers. Young teachers are born in the age of technology, they might be more techno-savvy and might have more confidence in using ICT compare to senior teachers. Young teachers who were educated in an educational system were ICT was the norm. It would not, therefore, be surprising for them to be familiar with the use of ICT for teaching-learning. It would not be unusual for young teachers to be using ICT in professional work more than their counterparts. Earlier research also reflected a similar finding that the age of lecturers makes a dissimilarity of ICT utilization. It is concluded that the different ages of lecturers have a different use of ICT. (Lubis, Syed and Sarji, 2017)

The findings also reveal that highly and moderately competent faculty members had more usage of ICT than the less competent faculty members. High and moderate competency levels may give more confidence in the use of ICT and therefore they may use more ICT. Faculty members' high ICT experience relates positively to their usage of ICT. The above table also indicates that faculty members who integrate ICT at a moderate and high level as well as found the high and moderate influence of ICT on their professional work use more ICT than their counterparts. Earlier research has been carried out on teachers' self-efficiency stated to have greater impact on their use of ICT. Teachers' expertise with computer technology is a crucial factor in the successful use of ICT (Ali, Haolader and Muhammd, 2013).

4.3 Opinions of the Faculty Members towards ICT

4.3.1 Overall and variable wise opinions of the faculty members towards ICT

According to Qasem and Viswanathappa (2016), technology adoption decisions are subjective by teacher views and attitudes towards technology, which are formed from specific underlying personal beliefs about the consequences of using technologies. Successful integration of ICT in the teaching-learning process is dependent on teachers'

perceptions and opinions towards ICT. The present study also finds out the opinions of the faculty members towards the use of ICT in their teaching, research, and administrative work. This section gives the vision about the opinions of the faculty members of The Maharaja Sayajirao University of Baroda towards ICT.

Table 42: Frequency and Percentage Distribution of the Faculty Members According to their Opinions towards ICT

(n=290)

Opinions towards ICT	F	%
Favorable	157	54.1
Unfavorable	133	45.9
Total	290	100

It is a positive indication that more than half of the faculty members (54.1%) had favorable opinions towards ICT. Teaching through ICT is a user friendly way as it is interactive and more attractive to students. Both students and teachers have wider exposure to information through it. ICT improves students' engagement in class, improve knowledge retention, encourage individual learning, encourage collaboration, students can learn useful life skills through technology (Savvidis, 2020). There is a possibility that faculty members may observe all the above benefits of ICT while using it in their class and therefore they may have favourable opinions towards it. These faculty members may have more exposure and extended use of ICT. They may be techno-savvy and techno-friendly.

The data presented in the above table also reflect that forty-five percent of the faculty members had unfavorable opinions towards ICT. The faculty members who were unfamiliar with technology and have anxiety in using technology may have unfavorable opinions towards ICT. Their lack of knowledge and skills in using ICT may lead to unfavourable opinions. Challenges faced by them while using ICT such as lack of technological infrastructure, technical problems, lack of support from technical staff, lack of effective training could be another reason for unfavourable opinions towards ICT.

Table 43: Frequency and Percentage Distribution of the Faculty Members According to their Opinions towards ICT in Relation to the Selected Variables

(n=290)

Variables	n	Opinions towards ICT			
		Favorable		Unfavorable	
		F	%	F	%
Age					
Young Teachers	101	57	56.43	44	43.56
Middle Aged	91	47	51.64	44	48.35
Seniors Teachers	98	53	54.08	45	45.91
Discipline					
Science and Technology	136	79	58.03	57	41.91
Humanities	106	57	53.77	49	46.22
Social Science	48	21	43.75	27	56.25
Designation					
Temporary Teaching Assistant	45	26	57.77	19	42.22
Temporary Assistant Professor	94	52	55.31	42	44.68
Assistant Professor	84	44	52.38	40	47.61
Associate Professor	25	13	52	12	23.07
Professor	42	22	52.38	20	47.61
Competency in Using ICT					
Less Competent	104	58	55.80	46	44.20
Moderately Competent	90	46	51.10	44	48.90
Highly Competent	96	53	55.20	43	44.80
Technological Infrastructure					
Good	144	81	56.3	63	43.8
Poor	146	76	52.1	70	47.9

Table 43 reveals that a higher percentage of the faculty members belonging from all the categories of variables except Social Science had favourable opinions towards ICT. It can be inferred from the above table that faculty members' age, designation, competency in using ICT and technological infrastructure in the department does not make any differences in their opinions towards ICT.

Discipline wise the difference was observed as faculty members belonging from Social Science had unfavourable opinions towards ICT than their counterparts. The probable reason for this finding could be that Social Science deals with the languages, arts, social and socio-economic aspects of the society where they may found less scope to use technology. Despite this, the findings of the present study reflect the high usage of ICT among Social Science teachers than their peer group (refer to table number 41). It a good indication that they have unfavourable opinions towards ICT still the high usage found among them.

Further, the above table also highlights that within a group the young teachers belonging from Science and Technology, Temporary Teaching Assistant, and with good technological infrastructure in the department had more favourable opinions than their counterparts.

4.3.2 Overall intensity indices for opinions of the faculty members towards ICT

Table 44: Item wise Intensity Indices Showing the Opinions of the Faculty Members Towards ICT

(n=290)

Items	I.I
It improves the quality of teaching	2.87
It helps in producing varied teaching materials like pamphlets, booklets	2.58
It makes teaching more effective	2.56
Raise the working efficiency of a teacher as a teacher	2.56
It makes the lectures more interesting and diverse	2.55
Essential to prepare students to live and work in the 21st century	2.55
It facilitates teaching strategies	2.52
It allows the students to learn more	2.50
It needs to be used along with other teaching formats	2.50
Disseminates information amongst the students more effectively	2.49
It makes the course content more lively in the class	2.49
It makes teachers more encouraged, interested and involved in working with their students	2.47
It makes communication between teacher and students easier	2.45
Enhances the teacher's role, and makes him/her more professional.	2.45
It makes students enthusiastic about learning	2.42
Positively changes the learning climate in a lecture room.	2.39
Encourage students to explore situations and more information	2.35
It makes calculations and manipulations easier.	2.34
It needs clarity about how to integrate it into teaching-learning	2.16
It needs a complete change in the teaching style of a teacher	2.08
Cannot judge gain in knowledge of the students	2.06
Requires more time to integrate it into teaching	2.00
Limits students thinking	2.00
Limits the freedom of a teacher in terms of content delivery	1.95
Gives superficial knowledge to the student	1.92
It makes the lesson less effective compared to the regular lesson	1.91

The above table indicates the item-wise intensity indices for the faculty members' opinions towards ICT that ranged from 2.87 to 1.91. It can be seen from the above table that the faculty members agree on having favorable opinions towards ICT with regards to the following items:

- Improves the quality of teaching and makes it more effective.
- Helps in producing varied teaching materials.
- Raises 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.
- It allows students to learn more.
- Needs to be used along with other teaching formats.
- Disseminates information amongst students more effectively.
- It makes the course content more lively in the class.
- It makes teachers more encouraged, interested and involved in working with their students.
- Makes communication between teacher and students easier.
- Enhances a teacher's role, and makes him/her more professional.
- Make students enthusiastic about learning.
- Positively changes the learning climate in a lecture room.
- Encourage students to explore situations and more information
- It makes calculations and manipulations easier.

This portrayed faculty members had more favourable opinions towards ICT as it improves the quality of teaching; makes teaching more effective and interesting; makes communication between students and teachers easier. This was supported by the empirical study findings conducted by Ali, Haolader, and Muhammad (2013) who found that most of the teachers strongly agree that ICT is necessary for the teaching-learning process; it made communication easy through the internet; helps in easy and quick access to information; reduces the burden of keeping hardcopies, and improved quality of work. In the present study, faculty members also had similar opinions for ICT. Teachers' opinions towards ICT are an important factor in the success of technology integration in education. The findings also reveal that faculty members

agreed to less extent for the negative items towards ICT like it limits students' thinking; gives superficial knowledge to the students; makes the lesson less effective compared to the regular lesson. It shows that faculty members had favourable opinions towards negative items.

4.4 Competency in Using ICT

4.4.1 Overall and variable wise competency of the faculty members in using ICT

ICT competency is defined as being able to handle a wide range of varying ICT applications for various purposes (Ali, Haolader, and Muhammad, 2013). The rapid development in ICT has brought extraordinary changes in recent years. ICT is now becoming increasingly significant in daily lives and educational systems. As the teacher plays an important role in the management of learning, the teacher should equip themselves with ICT competencies to design a new learning environment using most modern technologies in the field of education (Qasem and Viswanathappa 2016). The present study also focuses on the competencies of the faculty members in using ICT and findings related to this are discussed in this section.

Table 45: Frequency and Percentage Distribution of the Faculty Members According to their Competency in Using ICT

(n=290)

Competency in Using ICT	F	%
Highly Competent	96	33.10
Moderately Competent	90	31.01
Less Competent	104	35.86
Total	290	100

The level of competencies in using ICT does not differ much between the groups. A higher percentage of faculty members (35.86%) were less competent in using ICT. The possible reason for these findings could be that the majority of the faculty members not attended any training programmes related to ICT (refer to table number 28). Those who have finished their initial training they do not expect to need much further training therefore they make take less initiative to improve their practice and learn new skills.

Another reason could be that ICT training organized by university in past years might have focused on limited programmes/software. Hence, many faculty members may not feel confident or competent in using ICT. This finding consisted of the results of Das, Kharbuli and Rynjah (2017) who also found inadequate knowledge and skills regarding ICT in teaching faculties'.

Further, the data reflects that a little higher percentage (33.10%) of the faculty members had high competency than those having moderate (31.04%) competency. Teachers have a high level of ICT competency due to their prior knowledge of ICT. These also result in a high level of confidence in using ICT (Edumadze & Owuau, 2013). The present study may also observe a similar reason for high competency amongst the faculty members.

Figure 18: Percentage Distribution of the Faculty Members According their Competency in Using ICT

(n=290)

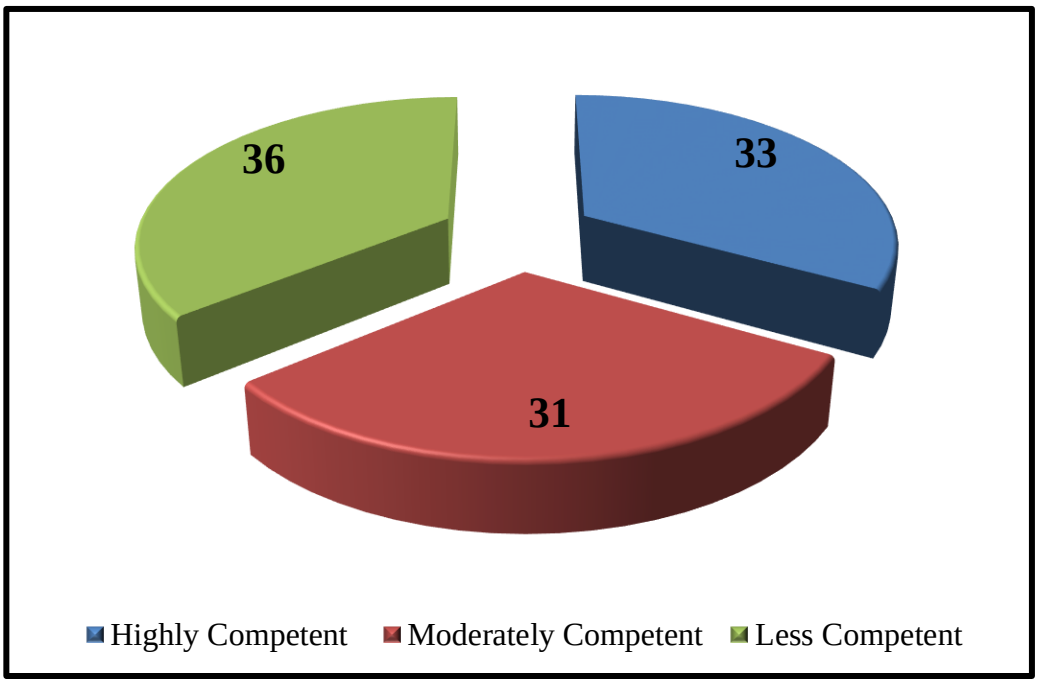


Table 46: Frequency and Percentage Distribution of the Faculty Members According to their Competency in Using ICT in Relation to Selected Variables

(n=290)

Variables	N	Competency in Using ICT					
		Less		Moderately		Highly	
		F	%	F	%	F	%
Age							
Young Teachers	101	35	34.65	37	36.63	29	28.71
Middle Aged Teachers	91	33	36.26	27	29.67	31	31.63
Senior Teachers	98	37	37.75	36	36.73	25	25.51
Discipline							
Science and Technology	136	46	33.82	56	41.17	34	25
Humanities	106	45	42.45	25	23.58	36	33.96
Social Science	48	14	29.16	19	39.58	15	31.25
Designation							
Temporary Teaching Assistant	45	15	33.33	15	33.33	15	33.33
Temporary Assistant Professor	94	36	38.29	29	30.85	29	30.85
Assistant Professor	84	28	33.33	31	36.90	25	29.76
Associate Professor	25	10	40	9	36	6	24
Professor	45	16	38.09	16	38.09	10	23.80
Opinions towards ICT							
Favorable	157	58	36.90	46	29.30	53	33.80
Unfavorable	133	46	34.60	44	33.10	43	32.30
Technological Infrastructure							
Good	144	36	25.0	53	36.8	55	38.2
Poor	146	68	46.6	37	25.3	41	28.1

Table 46 reveals that a higher percentage of the faculty members belonging to the following categories of variables admitted about being less competent in using ICT.

- Faculty members belonging to the middle-aged and senior teachers
- Faculty members belonging to Humanities
- Temporary Assistant Professors, Associate Professor, and Professors

- Faculty members with favorable and unfavorable opinions toward ICT
- Poor technological infrastructure

Further, the table also reveals that faculty members belonging to the following categories admitted about being moderately competent in using ICT.

- Young teachers
- Those belonging from Science and Technology and Social Science
- Assistant Professors and Professors

Analysis of data shows that faculty members' competence is influenced by their age. It can be observed that young teachers were more competent than middle-aged and senior teachers. One contributor to the skills gap for faculty members seems to be age. It's not just age but a lack of daily experience that puts teachers off improving their digital skills. Resistance can be a result of a lack of confidence or fear of using ICT for learning. Faculty members may often worry that their knowledge level does not match those of their 'digitally native' students. Hence, less competency may found amongst the senior teachers than young teachers. It is also evident from the data that competency also influences by their discipline as faculty members' from Science and Technology, Social Science was more competent than faculty member belonging from Humanities. This situation might arise from the fact that Science and Technology faculty members are more confident in applying ICT than the Humanity teachers. Department of Science and Technology, Social Science might be more resourced in terms of ICT infrastructure than Humanities which may give them a chance to use and improve skills in different technology.

Table 47: Item Wise Intensity Indices of the Competency of the Faculty Members in Using Different ICT Tools (n=290)

Items	I.I
Install USB drive	2.94
Use smart boards	2.94
Connect the printer with other devices (such as mobile)	2.94
Use printer	2.91
Use the internet for communication	2.88
Use intranet	2.87
Prepare PowerPoint Presentation	2.87
Prepare word document	2.86
Check circulars on the university website	2.86
Search material online (such as e-books, e-journals)	2.85
Connect web camera with desktop/laptop	2.82
Download online videos	2.81
Save videos offline	2.80
Connect internet from mobile to laptop	2.79
Connect LCD projector with laptop	2.76
Contact other teachers and researchers online	2.75
Connect speakers with laptop/desktop	2.72
Use data storage software (such as Google Drive, Dropbox)	2.68
Zip/Unzip files/folders	2.67
Prepare Spread Sheets	2.67
Download blank mark list from the university website	2.65
Remove virus	2.61
Install new software	2.60
Upload data on Annual Report Management System	2.60
Prepare Graphs	2.57
Upload lectures/videos online	2.54
Add hyperlink	2.48
Solve simple problems (such as paper jam in the printer)	2.48
Use graphic software	2.42
Conduct virtual classes	2.30
Prepare Infographics	2.24
Design technology-enhanced learning material for students	2.23

Table 49 shows 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 able to use the following ICT tools at great extent:

- Install USB drive
- Use printer
- Use the internet for communication
- Prepare PowerPoint Presentation
- Prepare word document
- Check circulars on the university website
- Search material online (like e-books, e-journals)
- Download online videos
- Save videos offline
- Connect internet from mobile to laptop
- Connect LCD projector with laptop
- Upload data on Annual Report Management System

The findings of the present study revealed that faculty members were skillful in the internet application, which signifies that The Maharaja Sayajirao University teachers were highly competent in using the internet for searching and sharing information. As internet technology has been introduced for more than three decades ago, it is of no surprise that those faculty members were able to use it to seek information. Furthermore, the faculty members were also competent in basic ICT skills such as using a word processor, PowerPoint, USB drive. These software applications are commonly used among educators and nowadays, teachers are expected to be competent in these ICT skills to assist them in their teaching activities.

It is a positive indication that faculty members are competent in using basic ICT tools. However, they still lack some skills in advanced ICT applications such as in producing infographics, online course/website, and conducting virtual classes. This finding shows that faculty members still need to improve their ICT skills in using advanced ICT tools, which can be enhanced through online or offline training programmes related to ICT.

4.5 Integration of ICT

ICT has become an integral part of the pedagogical process in many learning institutions of the world. The integration of ICT in education programs promotes autonomous learning, curriculum differentiation, students centered learning, higher-order thinking, problem-solving, clarification of abstract concepts, and transmission of the understanding of the subject matter (Mwalongo 2011).This section deals with the findings related to the integration of ICT by the faculty members in teaching, research, and administrative work.

4.5.1 Overall Integration of ICT

Table 48: Frequency and Percentage Distribution of the Faculty Members According to their Overall Integration of ICT in Teaching, Research, and Administration Work

(n=290)

Integration of ICT	F	%
High	94	32.4
Moderate	94	32.4
Low	102	35.2
Total	290	100

ICT integration by the faculty members is highly dependent on their perception and their competency in using ICT. The findings of the present study reveal that a higher percentage of the faculty members were less competent in using ICT (refer table 45), and more number of them had unfavorable opinions towards ICT. Hence, these could be the reasons that thirty five percent of the faculty members reported overall low integration of ICT in their professional work. Another reason could be their views that traditional methods are always effective ways than technology based education. This finding aligned with Gracebell (2017) who found an average level of ICT integration amongst the teachers and this was also supported by results found by Lawrence (n.d) in his study.

On the other hand, data also reveals that equal percentage (32.4%) of the faculty members integrate ICT in their professional work at a high and moderate level. The

possible reason for this finding could be the availability of good technological infrastructure in the department which may facilitate them to integrate ICT in their professional work. Today, major tasks concerning to teaching, administration, and research are carried out through ICT. ICT plays an important role in today's education system from the admission of the students to the declaration of the results. At every stage of teaching, research and administration ICT contributes and makes the work easier. Therefore, may be the faculty members reported high integration of ICT in their professional work. The similar finding was reported by Opati (2013) in his study that ICT is primarily integrated as a tool for performing several academic activities by the teachers.

Figure 19: Percentage Distribution of the Faculty Members According to their Overall Integration of ICT

(n=290)

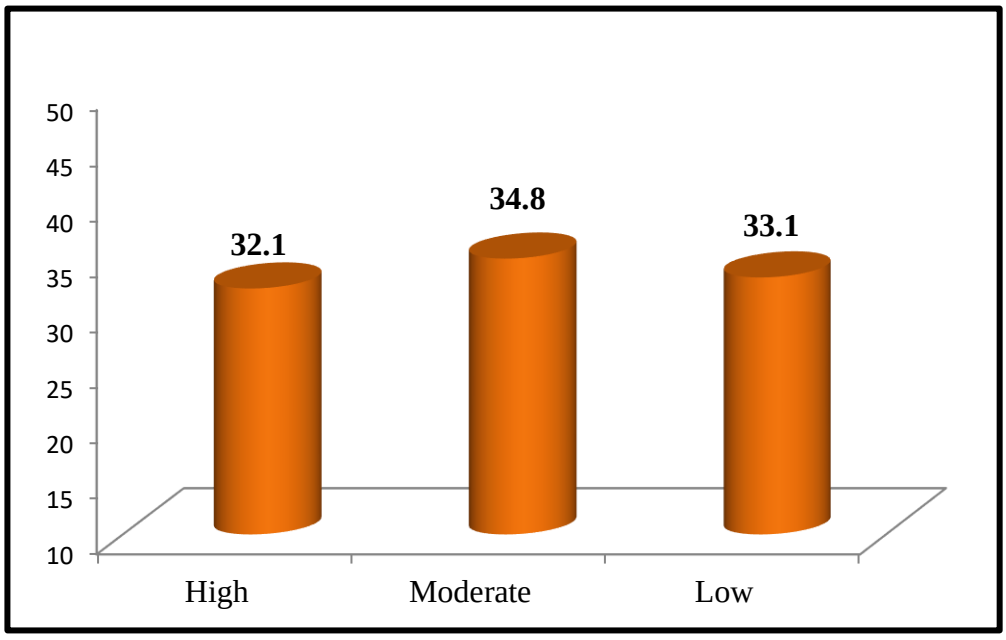


Table 49: Frequency and Percentage Distribution of the Faculty Members According to their Overall Integration of ICT in Relation to Selected Variables

(n=290)

Variables	N	Integration of ICT					
		High		Moderate		Less	
		F	%	F	%	F	%
Age							
Young Teachers	101	42	41.60	27	26.70	32	31.70
Middle Aged Teachers	91	26	28.60	31	34.10	34	37.40
Senior Teachers	98	26	26.50	36	36.70	36	36.70
Discipline							
Science and Technology	136	43	31.60	43	31.60	50	36.80
Humanities	106	28	26.40	36	34.00	42	39.60
Social Science	48	23	47.90	15	31.30	10	20.80
Designation							
Temporary Teaching Assistant	45	18	40.00	12	26.70	15	33.30
Temporary Assistant Professor	94	30	31.90	25	26.60	39	41.50
Assistant Professor	84	23	27.40	33	39.30	28	33.30
Associate Professor	25	6	24.00	12	48.00	7	28.00
Professor	42	17	40.50	12	28.60	13	31.00
Opinions towards ICT							
Favorable	157	43	27.40	42	26.80	72	45.90
Unfavorable	133	51	38.30	52	39.10	30	22.60
Competency in Using ICT							
Less Competent	104	6 2	59.61	2 4	23.07	16	15.38
Moderately Competent	90	2 3	25.55	4 2	46.66	25	27.77
Highly Competent	96	21	21.87	29	30.20	4 6	47.91
Technological Infrastructure							
Good	144	59	41.00	43	29.90	42	29.20
Poor	146	35	24.00	51	34.90	60	41.10

The above table reveals that a higher percentage of the faculty members belonging to the following categories of variables reported high integration of ICT in their professional work.

- Young faculty members.
- Those from Social Science discipline
- Temporary Teaching Assistants and Professors
- Faculty members having good technological infrastructure in the department.

Further, the data also reveals that higher percentage of the faculty members belonging to the following categories of variables reported low integration of ICT in their professional work.

- Middle-aged teachers and senior teachers
- Those from Science and Technology, and Humanities
- Temporary Assistant Professor,
- Highly competent in using ICT,
- Those have favorable opinions towards ICT
- Those having poor technological infrastructure in the department

Young teachers may accept and adapt the change easily than middle aged and senior teachers. Middle aged and senior teachers may did not want to receive any training on ICT in order to improve their ICT competency. They may have the views that traditional methods are more effective ways of teaching-learning. Hence, they may have reported low integration of ICT than young teachers. The surprising finding was that those who were highly and moderately competent in using ICT reported less integration of it into their professional work. The probable reason for this finding could be that they may have skills in using ICT but they did not inclined to integrate it in their work. Another reason could be that they may know how to run certain software packages but did not know how to integrate it in their professional work. Further, it can be inferred from the above table that Assistant Professor, Associate Professors, those who were moderately competent in using ICT and had unfavorable opinions towards ICT reported moderate integration of ICT in their professional work.

4.5.2 Integration of ICT in Teaching

Table 50: Frequency and Percentage Distribution of the Faculty Members According to their Integration of ICT in Teaching

(n=290)

Integration of ICT	F	%
High	93	32.1
Moderate	101	34.8
Low	96	33.1
Total	290	100

Recently the integration of ICTs into university teaching has been the topic of much debate. Since the second half of the 90s and particularly the explosion of accessibility to the World Wide Web network one note the rapid development in the integration of ICT in the university teaching (Lawrence, n.d). The findings of the present study also reveal that a higher percentage of the faculty members integrate ICT into their teaching work at a moderate level. The primary motivation for using technology is its perceived usefulness. According to Baek, Jung & Kim (2008), ICT increases the interest in learning, enables digital materials to be handled easily, saves time and physical efforts, and simulates the real world (Cited in Badia Meneses, and Sigales, 2013). These could be expected reasons for the moderate integration of ICT by faculty members in teaching.

The integration of ICT in the classroom depends on the contextual factors related to the conditions facilitating the integration of ICT and the characteristics of the teacher. It means competent teachers with good technological facilities may be more inclined to integrate ICT or it can be another way also. Hence, these could be the reasons that almost an equal percentage of the faulty members integrate ICT in the teaching at a high (32%) and low (33%) level. According to Jones (2010) teachers feel reluctant to integrate ICT if they lack confidence. Fear to failure and lack of ICT knowledge have been cited as some of the reasons for teacher's lack of confidence in adopting and integrating ICT into their teaching (cited in Ali, Haolader & Muhammad, 2013). Edumadze and Owusu (2013) concluded that the teacher's lack of technical knowledge regarding the efficient integration of ICT into their teaching leads to low integration of

it. In the present study, the faculty members may also observe similar reasons for the low integration of ICT in teaching. The contradictory finding was reported by Fofanah (2018) in his study that the integration of ICT tools for academic work among teaching staff was very high. Edumadze and Owusu (2013) suggested that encouraging lecturers to integrate ICT into their teaching may help to equip them with the skills and make them literate with the knowledge they require for effective integration of ICT in teaching. Bamigboye, Bankole, Ajiboye and George (2013) concluded that to promote

4.5.3 Differences in the Integration of ICT in Teaching by the Faculty Members in Relation to the Selected Variables

Table 51: Differences Calculated Through t-ratio for the Integration of ICT in Teaching by the Faculty Members in Relation to Selected Variables

(n=290)

Variables	Categories	n	Mean	S.D.	t – Value
Opinions towards ICT	Favourable	157	31.62	9.53	-4.22*
	Unfavourable	133	36.11	8.37	
Technological Infrastructure	Good	144	32.16	9.89	-2.84
	Poor	146	35.22	8.37	

*Significant at 0.01

The findings related to the difference in the integration of ICT in relation to the selected variables are described here. The data presented in the above table indicates that there was no significant difference in the integration of ICT in teaching concerning technological infrastructure. This clearly shows that technological infrastructure was not the reason nor it was a barrier for them to integrate ICT in teaching. Hence, the null hypothesis stating that there will be no significant difference in the integration of ICT in teaching in relation to technological infrastructure was accepted.

Further, it can be seen from Table 53 that concerning their opinions towards ICT there was a significant difference in the integration of ICT in teaching. It indicates that the opinion wise differences exist concerning the integration of ICT in teaching. It is a surprising finding that those who had unfavorable opinions had high integration of ICT

than those who had favorable opinions. It means that the integration of ICT in teaching differed according to the variation in the opinions towards ICT. Thus, the null hypothesis stating that there will be no zsignificant difference in the integration of ICT in relation to their opinions towards ICT was not accepted.

Table 52: Analysis of Variance (ANOVA) Indicating Integration of ICT by Faculty Members in Teaching in Relation to Selected Variables

(n=290)

Variables	Source of Variance	DF	Sum of Square	Mean Square	F Value	Sig.
Discipline	Between Groups	2	201.50	100.75	1.17	0.31
	Within Groups	287	24673.30	85.97		
Age	Between Groups	2	289.72	144.86	1.69	0.19
	Within Groups	287	24585.09	85.66		
Designation	Between Groups	2	89.87	22.46	0.26	0.90
	Within Groups	287	24784.94	86.96		
Competency in Using ICT	Between Groups	2	2309.300	1154.650	14.69*	.001
	Within Groups	287	22565.51	78.62		
Problems in Use of ICT	Between Groups	2	377.32	188.66	2.20	0.11
	Within Groups	287	24497.48	85.36		
Use of ICT	Between Groups	2	1123.71	561.85	6.79*	0.01
	Within Groups	287	23751.10	82.77		
Influence of ICT	Between Groups	2	3724.89	1862.44	25.27*	0.01
	Within Groups	287	21149.91	73.69		

*Significant at 0.01

Table 52 reveals that there were no significant differences in the integration of ICT in teaching in relation to their age, discipline, and designation. It indicates the integration of ICT in teaching with their age, discipline, and designation did not differ significantly. Thus, the null hypotheses stating that there will no significant differences in the integration of ICT in teaching concerning their age, discipline, and designation were accepted. It shows that the integration of ICT did not differ according to the variation in their age, discipline, and designation. These variables were neither the reasons nor it was barriers for them to integrate ICT in their teaching. A similar finding

was found by Gracebell (2017) in his study also. On the other hand, the contradictory finding was found in the study by Peeraer and Petegem (2010) who found age and discipline influenced the integration of ICT in teaching.

The data presented in the above table also highlights that there were significant differences in the integration of ICT in teaching with their competency in using ICT, the use of ICT, and the influence of ICT. To know which group of the competency level, usage, and influence level differed significantly the data were further analyzed, and the results are presented in the below table.

Table 53: Tukey's HSD Comparison for Integration of ICT in Teaching by Faculty Members in Relation to Selected Variables

Variable	I	Mean (I)	J	Mean (J)	Mean DF (I – J)	SE	Sig.
Competency in Using ICT	Moderately Competent	35.10	Less Competent	29.97	5.13	1.27*	0.01
	Highly Competent	36.38			6.40	1.26*	0.01
Use of ICT	High	36.09	Low	31.27	4.83	1.31*	0.01
Influence of ICT	High	38.11	Less	29.32	8.79	1.24*	0.01
	Moderate	34.15			4.83	1.21*	0.01
	High	38.11	Moderate	34.15	3.96	1.25**	0.05

* Significant at 0.01, ** Significant at 0.05

It can be seen from the above table that differences appeared in the integration of ICT in teaching in relation to competency in using ICT. Lectures prior knowledge and skills in ICT use best predicted the extent of ICT integration in the teaching process (Edumadze and Owusu, 2013). A similar finding was observed in the present study also. Highly and moderately competent faculty members significantly differed in their integration of ICT in teaching than those who were less competent in using ICT. It can be revealed that faculty members with high and moderate competencies in using ICT had more integration of ICT in teaching than those having less competency in ICT.

These findings suggest that the faculty members having a high and moderate level of competency in ICT were more inclined to integrate ICT in teaching than their counterparts. Many lecturers lacked adequate training and competency in using ICT for effective teaching. Training conducted to train teachers in the use of ICT might be focused on the technical aspects of ICT with little training about the pedagogical practices required and how to incorporate ICT in the curriculum. The study by Ezeugbor (2011) concluded that teachers' ICT integration for quality teaching is directly related to their level of ICT competency. Shaikh and Khoja (2013) observed in their study that there was a delay in the integration of ICT in higher education due to teachers' lack of ICT competency as they spend little time to learn ICT skills. This confirms the importance of ICT competency for the integration of ICT in education. In the present study, the faculty members with less competency may also observe similar reasons for the low integration of ICT in their teaching than their counterparts. The study carried out by Peeraer and Petegem (2010) found supported findings and indicated that better-skilled teacher educators tend to use more diverse ICT applications and on a more regular basis than teacher educators who perceive lower ICT skills. Thus, the null hypothesis stating that there will be no significant difference in the integration of ICT in teaching by the faculty members in relation to their competency in using ICT was not accepted.

Further, the data also reveals that the faculty members, who use ICT at a high level, integrate it more than those who use it at a low level. The findings of the present study discussed in the previous section indicate that a higher percentage of them use basic ICT tools such as M. S.Office, internet, LCD projector regularly. Hence, their usage of these tools was found high which may lead to the high integration of ICT by them than their counterparts. The data also reflects that those faculty members who found a high and moderate influence of ICT on their professional work integrate ICT at a high level than those who found a less influence of ICT on their professional work. Thus, the null hypotheses stating that there will be no significant differences in the integration of ICT in teaching in relation to their use and influence of ICT on their professional work were not accepted.

4.5.4 Item Wise Findings for the Integration of ICT in Teaching by the Faculty Members

To confirm the intensity of integration of ICT in teaching, the item-wise intensity indices were calculated. The scale to judge the integration of ICT in teaching included 16 items. For each item, there were three options mentioned which indicated there intensity indices related to the integration of ICT in teaching. The matters that more faculty members reported are mentioned below.

Table 54: Item Wise Intensity Indices Showing Integration of ICT in Teaching by the Faculty Members

(n=290)

Items	I.I
Browse/search the internet to collect information to prepare class lectures	2.61
Browse/search the internet to collect materials to be used during lectures (such as videos, slides)	2.48
Prepare presentations for the class	2.45
Create customized digital learning materials (such as e-content, video, slides)	2.36
Use online applications to connect with the students (such as e-mail, Google Hangouts, WhatsApp, Skype)	2.33
Design online course related to their subject.	2.27
Prepare evaluation exercises/self-evaluation exercise for students on a computer (such as quiz, online test)	2.08
Update themselves by joining online professional development courses.	2.06
Provide feedback to the students related to their performance through ICT (Such as Like send a message on WhatsApp, e-mail,)	2.06
Participate in online social networks of the teachers	2.05
Participate in a online discussion forum related to their subject of interest.	1.99
Refer material on Hansa Mehta Library portal to prepare class notes.	1.93
Post online assignment for students (Such as On Google Classroom, e-mail)	1.91
Give an assignment to students based on Hansa Mehta Library reference work. (such as search of e-journals, e-books, archives).	1.80
Write a blog on their subject.	1.74
Integrate new software (like Prezi) in teaching	1.58

It can be seen from Table 56 that for 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 the low level. The above table further classifies that the faculty members integrate ICT in teaching for following matters at a high level.

- To collect the information for preparing their class lectures
- To collect resources to use them during class lectures (such as videos, slides)
- For Preparing presentations for the class
- To create customized digital learning materials for the students (such as e-content, videos, slides)
- To stay in connect with the students via online applications (such as e-mail, Google Hangouts, WhatsApp, Skype)

These findings indicate that faculty members highly integrate ICT for their class preparation, and to make their lectures more interesting through videos and slides. It is a positive indication that faculty members were creating a blended learning environment for their students. The data also reflect the high usage of online applications such as e-mail, WhatsApp, Skype amongst the faculty members. With the advent of internet technology, online application has become an integral part of everyone's life. So, it is not surprising if faculty members also reported high integration of these media to stay connected with their students. Through these applications, it is easier and convenient to exchange information, communicate with each other, and stay connected. Earlier research also supported the present finding that teachers use the internet, computers, and M.S Office for lesson preparation and classroom teaching (Dang, n.d) and they also use tools like WhatsApp, Skype, Twitter to accomplished task related to their academic work (Fofanah, 2018).

Further, it is also revealed from the above table that faculty members moderately integrate ICT in teaching with regards to:

- Design online courses related to their subjects.
- Prepare online evaluation exercises/self-evaluation exercises for the students (such as quiz, online test)
- Update themselves via joining online professional development courses.

- Provide feedback to the students related to their performance through ICT (such as sending messages through WhatsApp, e-mail,)
- Participate in online social networks of the teachers
- Participate in a discussion forum on the internet related to their subjects of interest.
- Refer materials on Hansa Mehta Library portal to prepare their class notes.
- Post online assignment for the students (such as On Google Classroom, e-mail)
- Give assignments to the students based on Hansa Mehta Library reference works (such as search of e-journals, e-books, archives).
- Write a blog on their subjects.

It can be inferred from the findings that faculty members integrate the internet majorly for searching the information and using applications that allow them to be connected with their students. The integration of the internet was found moderate for creating online courses, online evaluations, for their professional development, and to be connected with other teachers and experts. It indicates that faculty members integrate ICT as a supplement informal teaching as they were moderately competent in conducting virtual classes and designing online courses. This finding consisted of the results reported in the study carried out by Vajargah, Jahani and Azadmanesh (2010) that ICT is integrated into the curriculum as supplementary software for effective teaching and learning by the teachers.

4.5.5 Integration of ICT in Research Work

Table 55: Frequency and Percentage Distribution of the Faculty Members According to their Integration of ICT in Research work

(n=290)

Integration of ICT	F	%
High	91	31.4
Moderate	96	33.1
Low	103	35.5
Total	290	100

ICT helps in contacting other researchers, make research publications easier, help in finding funding agencies for research projects still the findings of the study reveal low integration of ICT in research works amongst the higher percentage (35.5%) of the faculty members. The probable reason for this finding could be the low usage of online resources, reference managing software, and internet-based resources amongst the faculty members. Another reason could be that the university has a well-equipped library with several resource materials. So faculty members might be more reliant on the traditional method of visiting the library for a search of information. Background information of the faculty members indicates that the majority of them were young, working on an ad-hoc basis. These faculty members cannot take sponsored research projects nor can guide the research students independently. The main guide or principal investigator can only be permanent staff. These also could be the reasons for low ICT integration by the faculty members. A contradictory finding was found by Lawrence (n.d) that majority of the teachers integrate ICT in research work.

On the other hand, the findings of the study also revealed that an almost equal percentage of the faculty members integrate ICT in research works at high (31.4%) and moderate (33.1%) level. These findings show that the university has a group of faculty members who integrate ICT in research work at a high and moderate level. The faculty members who had good technological infrastructure in their department and with high competency may integrate ICT at a high and moderate level. This group of faculty members may be techno-friendly and may have more experience in using ICT. They may be favorably disposed to the use of ICT for research purposes for convenience in communication with other researchers and access to research materials globally.

4.5.6 Differences in the Integration of ICT in Research Work in Relation to the Selected Variables

Table 56: Differences Calculated through t-ratio for the Integration of ICT in Research by the Faculty Members in Relation to Selected Variables

(n=290)

Variables	Categories	N	Mean	S.D.	t – Value
Opinions towards ICT	Favourable	157	30.34	13.61	-2.12
	Unfavourable	133	33.19	8.07	
Technological Infrastructure	Good	144	32.54	7.39	-1.32
	Poor	146	30.76	14.39	

*Significant at 0.01 level

The data presented in the above table portrays the significant difference in the integration of ICT in research work concerning their opinions towards ICT and technological infrastructure. The analysis of variance showed no significant differences in the overall integration of ICT in research work with their opinions towards ICT and technological infrastructure in the department. Thus, the null hypotheses stating that there will be no significant differences in the integration of ICT in research work in relation to their opinions towards ICT and technological infrastructure was accepted. It shows that the integration of ICT in research work did not differ according to the variation in their opinions towards ICT and technological infrastructure.

Table 57: Analysis of Variance (ANOVA) Indicating Integration of ICT in Research by the Faculty Members in Relation to Selected Variables

(n=290)

Variables	Source of Variance	DF	Sum of Square	Mean Square	F Value	Sig.
Discipline	Between Groups	2	711.51	355.75	2.73	0.07
	Within Groups	287	37360.89	130.17		
Age	Between Groups	2	764.53	382.27	2.94	0.05
	Within Groups	287	37307.88	129.99		
Designation	Between Groups	2	1039.41	259.85	2.00	0.09
	Within Groups	287	37033.00	129.94		
Competency in Using ICT	Between Groups	2	3076.92	1538.46	12.62*	0.01
	Within Groups	287	34995.49	121.93		
Use of ICT	Between Groups	2	2938.57	1469.28	12.00*	0.01
	Within Groups	287	35133.85	122.42		
Problems in Use of ICT	Between Groups	2	140.09	70.05	0.53	0.59
	Within Groups	287	37932.32	132.17		
Influence of ICT	Between Groups	2	5102.05	2551.02	22.20*	0.01
	Within Groups	287	32970.36	114.87		

*Significant at 0.01

Table 59 shows the differences in the integration of ICT in research work by the faculty members concerning selected variables. The findings of the study indicate that there were no significant differences in the integration of ICT in research work in relation to their age, discipline, designation, and problems faced by them in the integration of ICT. The significant differences were found in the integration of ICT in research work by the faculty members with their competency in using ICT, the use of ICT, and the influence of ICT. Hence, the null hypotheses stating that there will be no significant differences in the integration of ICT in research work in relation to their competency in using ICT, the use of ICT, and the influence of ICT were not accepted and other null hypotheses stating that there will be no significant differences in the integration of ICT in relation with other selected variables were accepted.

Table 58: Tukey's HSD Comparison for Integration of ICT in Research Work by Faculty Members in Relation to Selected Variables

Variable	I	Mean (I)	J	Mean (J)	Mean DF (I – J)	SE	Sig.
Competency in using ICT	Moderately Competent	35.10	Less Competent	29.97	6.50*	1.59	0.01
	Highly Competent	36.38		29.97	7.04*	1.56	0.01
Use of ICT	High	36.09	Moderate	33.71	5.06**	1.59	0.05
		36.09	Low	31.27	7.67*	1.59	0.01
Influence of ICT	Moderate	34.15	Less	29.32	6.78*	1.52	0.01
	High	38.11		29.32	10.04*	1.55	0.01

*Significant at 0.01 and ** Significant at 0.05

The above table gives a broader view of comparison among the integration of ICT in research work with categories of selected variables. It highlighted that faculty members with high competency (36.38, p=.01), moderate competency (35.10, p=.01), high usage (36.09), moderate influence (34.15, p=.01), and high influence (38.11, p=.01) had high integration of ICT than faculty members with less competency (29.97), moderate usage (33.71, p=.05), low usage (31.27, p=.01) and less influence (29.32) respectively. The mean differences between these categories were higher than the others. The integration among all the categories significantly differed.

Earlier studies specify similar findings. The majority of faculty members had moderate or much competency on basic ICT operations was the reasons for high integration (Ziba, 2013). Moreover, the findings can also be compared with the viewpoint of the Diffusion of Innovation Theory (Roger, 1962). It suggests that the adoption of innovation such as technology does not function similarly and simultaneously in a social system. This indicates that there are some people more appropriate to adopt innovation than others. Thus, the differences arise among their integration of that technology (cited in Chauhan, 2018). In light of present findings, it may be worth saying that highly and moderately competent faculty members with high usage were

early adopters of technology. Hence, their integration may found high than their counterparts.

4.4.3.3Item Wise Findings of the Integration of ICT in Research by the Faculty Members

Table 59: Item wise Intensity Indices Showing Integration of ICT by the Faculty Members in Research Work

(n=290)

Items	I.I
Refer online books/journals to write review, articles, books	2.59
Collect information related to the research topic through an online database	2.52
Refer materials from specific research related websites (such as Springer, J-Gate, Science Direct)	2.46
Refer online thesis/projects for research	2.38
Discuss/share/solve quarries of research work through online researchers group (such as Research Gate, Academia Edu.)	2.37
Store research data and other important documents online (such as on Google Drive or Dropbox)	2.33
Refer materials available on Hansa Mehta Library Portal for review of the literature. (such as e-journals, e-books, OKG)	2.32
Check plagiarism through software like Urkund	2.18
Prepare and submit a research proposal to funding agencies through ICT	2.17
Search and approach funding agencies online	2.17
Collect data through online data collection software (such as Google forms, surveymonkey.com)	2.10
Check and use style manual online	2.08
Check grammar through software like Grammarly, thesaurus.com	2.01
Prepare citation through reference managing software (such as Mendeley, Zotero)	1.98

Table 61 shows the overall intensity indices regarding the integration of ICT in research work by the faculty members ranged from2.59 to 1.98. it means that the integration of ICT in research work by faculty members range from high to moderate level on the above-mentioned matters.

It can be further seen from the above table that the faculty members had high integration of ICT in research work for the following matters:

- Referring online books/journals to write reviews, articles, books.
- Collect information related to the research topic through an online database.
- Referring materials from specific research related websites.
- Referring online thesis/projects for the research
- Discussing/sharing/solving quarries of research work through online researchers groups
- Storing research data and other important documents online
- For referring materials available on Hansa Mehta Library Portal for the review of the literature.

It can be inferred from the above findings that faculty members highly integrate ICT in their research work for literature search and storing huge research data. A literature search was not an easy job before ICT. It needs to perform a manual search on hard copies of literature in libraries and the search results were limited while a lot of research materials, literature, and artifacts today can be searched and stored using ICT (Mohod, 2020). Similar reasons can be inferred for the present findings.

Further, the data presented in the above table reflects that the faculty members integrate ICT in research work moderately with regards to the following matters:

- For checking plagiarism through software such as Urkund.
- For preparing and submitting their research proposals to funding agencies through ICT.
- To search and to approach funding agencies online.
- To collect data through online data collection software
- To check and to use style manuals online.

- For checking grammatical errors through software like Grammarly, thesaurus.com
- For preparing citations through references managing software.

Looking to the above findings it can be denoted that faculty members moderately integrate ICT in their research work for preparing effective research reports and to avail funded research projects. It indicates the application of ICT by faculty members in-post data analysis which includes references and bibliography compilation, plagiarism detection, and publication.

4.5.8. Integration of ICT in Administrative Work by the Faculty Members

Table 60: Frequency and Percentage Distribution of the Faculty Members According to their Integration of ICT in Administration Work

(n=290)

Integration of ICT	F	%
High	91	31.4
Moderate	97	33.4
Low	102	35.2
Total	290	100

It is a surprising finding that a higher percentage (35.2%) of the faculty members reported low integration of ICT into the administrative work when the university insist majority of administrative work to be done through ICT such as filing of the annual report, self-appraisal, inviting application for different teaching and non-teaching positions, students' admission and declaration of their results. Many teachers are appointed on different administrative positions where they might need to use ICT. Though, the present finding shows low integration of ICT by them in the administrative work.

On the other hand, thirty-one percent of the faculty members reported high integration of ICT into the administrative work. In the university faculty members work on different administrative positions such as exams in-charge, dean of students and sports, directors and co-directors of different institutes and cells, time table in-charge, etc. So, to perform all these roles faculty members need to use computers and the internet. ICT

also helps faculty members to communicate with faculty members of different departments who work in common university-level administrative committees.

4.5.9 Differences in the Integration of ICT in Administrative Work by the Faculty Members in Relation to the Selected Variables

Table 61: Differences calculated through t-ration showing differences in the Integration of ICT in Administration by the Faculty Members in Relation to Selected Variables

(n=290)

Variables	Categories	n	Mean	S.D.	t – Value
Opinions towards ICT	Favourable	157	27.85	12.27	- 1.52
	Unfavourable	133	29.68	7.14	
Technological Infrastructure	Good	144	29.13	7.48	- 0.71
	Poor	146	28.27	12.43	

*Significant at 0.01

The findings of the study reveal that there were no significant differences in the integration of ICT in administrative work by the faculty members concerning their opinions towards ICT and technological infrastructure. It means that differences in the opinions and availability of technological infrastructure did not affect the integration of ICT in the administrative work of the faculty members. These indicate that their opinions and technological infrastructure were neither the reason nor the barrier in the integration of ICT in administrative work. Thus, the null hypotheses stating that there will be no significant differences in the integration of ICT in administrative work in relation to the opinions towards ICT and technological infrastructure were accepted.

Table 62: Analysis of Variance (ANOVA) Indicating Integration of ICT by the Faculty Members in Administrative Work in Relation to Selected Variables

(n=290)

Variables	Source of Variance	DF	Sum of Square	Mean Square	F Value	Sig.
Discipline	Between Groups	2	426.82	213.41	2.04	0.13
	Within Groups	287	30010.86	104.57		
Age	Between Groups	2	383.54	191.77	1.83	0.16
	Within Groups	287	30054.15	104.72		
Designation	Between Groups	2	773.61	193.40	1.85	0.11
	Within Groups	287	29664.07	104.08		
Competency in Using ICT	Between Groups	2	2261.60	1130.80	11.52*	0.01
	Within Groups	287	28176.08	98.17		
Integration of ICT	Between Groups	2	2127.62	1063.81	10.79*	0.01
	Within Groups	287	28310.07	98.64		
Problems in Use of ICT	Between Groups	2	97.32	48.66	0.46	0.63
	Within Groups	287	30340.36	105.72		
Influence of ICT	Between Groups	2	3944.21	1972.11	21.36*	0.01
	Within Groups	287	26493.47	92.31		

*Significant at 0.01

It is clear from table 62 that there were no significant differences in the integration of ICT by the faculty members in administrative work concerning their age, designation, discipline, and problems faced by them in using ICT. It indicates that variation in their age, discipline, designation, and the problems did not affect the integration of ICT in administrative work. Hence, the null hypotheses stating that there will be no significant differences in the integration of ICT in administrative work by the faculty members in relation to their age, discipline, designation, and problems faced in the use of ICT were accepted.

Analysis of variance indicated significant differences in the integration of ICT by the faculty members in administrative work with their competency in using ICT, the use of ICT, and the influence of ICT on the professional work. To know which categories

have the differences the data was further analyzed which is presented in the below table.

Table 63: Tukey's HSD Comparison for Integration of ICT in Administrative Work by the Faculty Members in Relation to Selected Variables

Variable	I	Mean (I)	J	Mean (J)	Mean DF (I – J)	SE	Sig.
Competency in using ICT	Moderately Competent	35.10	Less Competent	29.97	6.24	1.43	0.01
	Highly Competent	36.38		29.97	5.33	1.40	0.01
Use of ICT	Moderate	33.71	Low	31.27	4.80	1.43	0.01
	High	36.09		31.27	6.36	1.43	0.01
Influence o ICT	High	38.11	Less	29.32	8.73	1.39	0.01
	Moderate	34.15		29.32	6.25	0.36	0.01

*Significant at 0.01, and ** Significant at 0.05

The results of the post-hoc show that faculty members with high and moderate competency significantly differed from those who were less competent in using ICT. Highly and moderately competent faculty members integrate more ICT than their counterparts in their administrative work. This shows that the competency level of the faculty members influences their integration of ICT in administrative work also. Therefore, the null hypothesis stating that there will be no significant differences in the integration of the ICT in administrative work in relation to competency in using ICT was not accepted.

Further, significant differences were observed in the integration and usage of ICT. Faculty members with high and moderate usage of ICT integrate more ICT in administrative work than those who had low usage of ICT. It shows that as the use of ICT increased the integration of ICT also increased amongst the faculty members. Hence, the null hypothesis stating that there will be no significant differences in the integration of ICT in administrative work in relation to the usage of ICT was not accepted.

The data presented in Table 63 also reveals that 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. This shows that the influence of ICT on faculty members' professional work affects their integration of ICT in their administrative work. Hence, the null hypothesis stating that there will be no significant differences in the integration of ICT in administrative work in relation to the influence of ICT in the professional work of the faculty members was not accepted.

4.5.10. Item Wise Findings of the Integration of ICT in Administrative work by the Faculty Members

Table 64: Item Wise Intensity Indices Showing Integration of ICT by the Faculty Members in the Administration Work

(n=290)

Items	I.I
Upload annual report online	2.65
Circulate circulars through ICT amongst the colleague (such as through e-mail, WhatsApp)	2.48
Intimate staff about forthcoming events through e-mail	2.45
Prepare self-appraisal on computer	2.43
Intimate about meetings to the staff and colleague through ICT	2.40
Download professional and legal documents (such as 16A form, online appointment letters)	2.39
Download and upload circulars from the university website regarding official matters	2.39
Participate in online groups of the M. S. University teachers. (such as WhatsApp, Google Group)	2.35
Download blank mark list from University website for result submission	2.35
Use computers for recruitment and work allotment to staff in the department	2.32
Coordinate with other faculty teachers for administrative work (such as meeting at university level)	2.27
Follow the government website to check new policies related to higher education.	2.21

Table 64 highlights 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. It can be seen from the above table that the faculty members had high integration of ICT in the administrative work for the following matters:

- Uploading annual report online
- For circulating circulars amongst the colleague
- To intimate staff about forthcoming events
- For self-appraisal
- Intimate about meetings to the staff and colleague
- For downloading professional and legal documents
- To download and to upload circulars from the university website regarding official matters
- To participate in online groups of the M. S. University teachers
- For downloading a blank mark list from the university website for result submission
- Using computers for recruitment and work allotment to staff in the department

The findings also reveal that faculty members integrate ICT in administrative work to a moderate level for the following aspects:

- Coordinate with other faculty teachers for administrative work (such as meeting at university level)
- Follow the government website to check new policies related to higher education.

4.6 Problems in Use of ICT

While enjoying the benefits of using ICTs in academic activities educators face some challenges. The opportunities provided by ICT to support teaching-learning are not problem-free, some barriers may discourage educators to integrate ICT in the classroom and prevent them from introducing supporting materials through ICT usage (Tapera and Kujek 2019). The most frequently identified barrier to ICT use lack of time to learn technology (Reilly, 2014). Shaikh & Khoja (2013) argued that poor /uneven distribution of ICT resources/infrastructure, high ICT expenditures, and lack of money,

poor ICT policy were major causes of deprived use of ICT in education. Lawrence (n.d) concludes that the high cost of bandwidth, inadequate and unreliable telecommunication services, and applications remained major challenges. It can be inferred from the variety of literature available for problems faced by university teachers that they have been facing problems while using ICT. This section will throw light on the problems faced by faculty members of The Maharaja Sayajirao University of Baroda in the use of ICT.

4.6.1 Overall Problems in Use of ICT

Table 65: Frequency and Percentage Distribution of the Faculty Members According to the Overall Problems Faced by them in the Use of ICT

(n=290)

Overall Problems	F	%
More	97	33.4
Moderate	94	32.4
Few	99	34.1
Total	290	99.9

The findings of the study reveal that almost equal percentage of the faculty members faced few (34%), more (33%), and moderate (32%) problems in the use of ICT in their professional work. This is a very good indication that more faculty members (34%) faced fewer problems. It indicates that faculty members might be getting enough technical support from the university. Contrarily the background information of the faculty members indicates that half of the faculty members had poor technological infrastructure in the department. Hence, many of them may face moderate and more problems. The findings of the present study also highlight that a higher percentage of the faculty members had low competencies in using ICT and their lack of self-efficiency in using ICT may be another reason for more and moderate problems faced by them in the use of ICT. Fofanah (2018) concluded that the use of ICT tools was a problem in the university as a high majority of the respondents agreed that the use of technology itself was a problem.

Table 66: Frequency and Percentage Distribution of the Faculty Members According to the Overall Problems Faced by them in Use of ICT in Relation to Selected Variables

(n=290)

Variables	n	Overall Problems					
		More		Moderate		Few	
		f	%	f	%	f	%
Age							
Young Teachers	101	39	38.60	26	25.70	36	35.60
Middle Aged Teachers	91	34	37.40	33	36.30	24	26.40
Senior Teachers	98	23	23.50	36	36.70	39	39.80
Discipline							
Science and Technology	136	41	30.10	41	30.10	54	39.70
Humanities	106	39	36.80	39	36.80	28	26.40
Social Science	48	16	33.30	15	31.30	17	35.40
Designation							
Temporary Teaching Assistant	45	17	37.80	11	24.40	17	37.80
Temporary Assistant Professor	94	31	33.00	31	33.00	32	34.00
Assistant Professor	84	29	34.50	30	35.70	25	29.80
Associate Professor	25	5	20.00	10	40.00	10	40.00
Professor	42	14	33.30	13	31.00	15	35.70
Opinions towards ICT							
Favorable	157	39	24.80	55	35.00	63	40.10
Unfavorable	133	57	42.90	40	30.10	36	27.10
Competency in Using ICT							
Less Competent	104	39	37.50	32	30.76	31	29.80
Moderately Competent	90	30	33.33	37	41.11	23	25.55
Highly Competent	96	37	38.56	31	32.29	28	31.11
Technological Infrastructure							
Good	144	43	29.90	46	31.90	55	38.20
Poor	146	53	36.30	49	33.60	44	30.10

Table 66 reveals that a higher percentage of the faculty members belonging to the following categories of variables faced more problems in using ICT in their professional work.

- Young and middle-aged
- Those from disciplines of Humanities
- Temporary Teaching Assistant
- Those having unfavorable opinions towards ICT
- High and less competency in using ICT and,
- Faculty members having poor technological infrastructure in the department

The findings of the present study indicated that young faculty members, Temporary Teaching Assistant, with high and moderate competency reported overall high usage and integration of ICT. It can be said that they use it highly. Hence, they may face more problems. This clearly shows that overall problems faced by the faculty members in the use of ICT were affected by their use and integration of ICT. As use and integration increase the problems faced by them also increases. Another possible reason could be that these faculty members may have inadequate ICT in their department, unavailability of the latest ICT equipment, and lack of expert technical staff. Therefore they may also face overall more problems.

Further, the data also reveals that a higher percentage of the senior teachers belonging from the Science and Technology discipline, Temporary Assistant Professors, Associate Professors, Professors, with favorable opinions and, those who had the good technological infrastructure in the department faced overall few problems in the use of ICT.

4.6.2. Non-Human Resources Related Problems Faced by Faculty Members

Table 67: Frequency and Percentage Distribution of the Faculty Members According to the Non-Human Resources Related Problems Faced by them in Use of ICT

(n=290)

Non-Human Resources Related Problems	F	%
More	80	27.6
Moderate	112	38.6
Few	98	33.8
Total	290	100

The non-human resources related problems include the technology-related problems in the present study. The finding shows that little less than forty percent (38.4%) of the faculty members faced a moderate level of problems whereas twenty-seven percent of the faculty members faced more non-human resources related problems in the use of ICT in their professional work. It means that almost half of the faculty members faced technology-related problems. They may have a lack of access to ICT in the department. A similar finding was reported by Fofanah (2018) that more than half of the respondents (54%) had a lack of access to ICT facilities in the university and ICT tools were not available for the teaching-learning process. Earlier researches also reported similar findings that faculty members faced technology-related barriers in the use of ICT (Shaikh & Khoja, 2013; Ferreira, 2019; Tapera & Kujeke, 2019; Lawrence, n.d). The data presented in the above table also indicate that little more than one third (33%) of the faculty members faced overall few problems in the use of ICT.

4.6.3. Differences in the Non-Human Resources Related Problems Faced by Faculty Members in Relation to Selected Variables

Table 68: Differences calculated through t-ratio for the Non-Human Resources Problems faced by the Faculty Members in the use of ICT in Relation to Selected Variables

(n=290)

Variables	Categories	n	Mean	S.D.	t – Value
Opinions towards ICT	Favourable	157	30.68	9.19	-2.97*
	Unfavourable	133	33.92	9.38	
Technological Infrastructure	Good	144	31.42	8.96	1.34
	Poor	146	32.90	9.9	

*Significant at 0.01

Table 68 shows the differences in non-human resources related problems faced by the faculty members with selected variables. The analysis of variance shows that there was a significant difference in non-human resources problems faced by the faculty members concerning their opinions towards ICT and there was no difference found in the same with technological infrastructure. It indicates that the faculty members with unfavourable opinions faced more problems than their peer group. These faculty members may have a higher level of technology phobia and were more likely to avoid technology than their counterparts. Another possible reason could be that they may have a negative attitude towards ICT. Hence, the difference was observed in non-human resources related problems faced by them in relation to their opinions towards ICT. Hence, the null hypothesis stating that there will be no significant difference in non-human resources related problems faced by faculty members in relation with opinions towards ICT was not accepted and other null hypothesis stating that there will be no significant difference in non-human resources related problems faced by faculty members in relation with technology infrastructure was accepted.

Table 69: Analysis of Variance (ANOVA) Indicating Non-Human Resources Problems Faced by Faculty Members in Using ICT in Relation to Selected Variables

(n=290)

Variables	Source of Variance	DF	Sum of Square	Mean Square	F Value	Sig.
Discipline	Between Groups	2	758.80	379.40	4.39*	0.01
	Within Groups	287	24783.92	86.36		
Age	Between Groups	2	141.09	70.54	0.79	0.45
	Within Groups	287	25401.63	88.51		
Designation	Between Groups	2	165.14	41.29	0.46	0.76
	Within Groups	287	2577.58	89.04		
Competency in Using ICT	Between Groups	2	233.41	116.70	1.32	0.27
	Within Groups	287	25309.31	88.19		
Integration of ICT	Between Groups	2	1042.52	521.26	6.11*	0.01
	Within Groups	287	24500.19	85.37		
Use of ICT	Between Groups	2	291.16	145.58	1.66	0.19
	Within Groups	287	25251.57	87.99		
Influence of ICT	Between Groups	2	1322.66	661.33	7.84*	0.01
	Within Groups	287	24220.06	84.39		

*Significant at 0.01

The analysis of variance highlights no significant differences in the non-human resources related problems faced by faculty members 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 differences have not existed concerning the non-human resources related problems. Thus, the null hypotheses stating that there will be no significant differences in the non-human resources related problems in relation to their age, designation competency in using ICT, and use of ICT was accepted. Further, the data also indicates significant differences in the non-human resources related problems faced by them concerning their discipline, integration of ICT, and the influence of ICT.

Table 70: Tukey's HSD Comparison for Non-Human Resources Related Problems Faced by Faculty Members in Relation to Selected Variables

Variable	I	Mean (I)	J	Mean (J)	Mean DF (I – J)	SE	Sig.
Discipline	Humanities	34.18	Science and Technology	30.61	3.57*	1.20	0.01
Integration of ICT	Moderate	33.12	Low	29.64	3.48**	1.32	0.02
	High	33.97			4.33*	1.32	0.01
Influence of ICT	Moderate	34.70	Less	29.57	5.13*	1.29	0.01

*Significant at 0.01, ** Significant at 0.05

Table 70 gives the broader view of comparison among non-human resources related problems faced by faculty members by showing the differences in categories of selected variables. It reflects that there was a difference in the problems faced by faculty members belonging to Humanities 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. These faculty members might have poor technological infrastructure in the department. They generally deal more with the courses related to literature where they might have less scope for the integration of ICT and therefore when they use ICT they faced more problems. On the other hand, the use of technology might be more in the field of Science and Technology and which could be the reason for this difference.

Furthermore, table 70 also shows significant differences in the problems faced by faculty members concerning their overall usage of ICT and the overall influence of it on their professional work. Faculty members with high usage (33.97;.p=.01), moderate usage (33.12;p=.02) and moderate influence (34.70) had a high mean score than those who had low usage (29.64) and less influence (29.57). 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. Thus, the null hypotheses stating that there will be no significant differences in the non-

human resources related problems faced by faculty members in relation to their discipline, integration of ICT, and influence of ICT were not accepted.

4.6.4. Item Wise Intensity Indices of Non-Human Resources Related Problems Faced by Faculty Members

Table 71: Item wise Intensity Indices Showing Non-Human Resources Related Problems Faced by Faculty Members in Using ICT

(n=290)

Items	I.I
Lack of smart boards	2.24
Smartboard is not working	2.22
Restriction in downloading/accessing certain application/software	2.09
Lack of money to buy the latest ICT	2.07
Certain websites are not accessed through University Wi-Fi	2.07
Slow Wi-Fi connectivity	2.04
Lack of LCD projectors	2.03
Lack of computers in the department for teaching	2.03
Poor/lack of robust and effective ICT policy.	2.00
The computer software is not updated.	1.99
Lack of computers with an internet connection	1.98
Slow internet connection with a frequent breakdown in the connectivity	1.98
Computers need repairing/outdated.	1.96
Computers are not supported by certain software (such as SPSS)	1.93
Lack of computer labs	1.87
Relevant content related to the subject is not available on the internet	1.68

The overall intensity indices for non-human resources related problems faced by faculty members were moderate. The item-wise intensity indices for the same ranged

from 2.24 to 1.68. Table 71 indicates a moderate level of problems for all the listed items related to non-human resources related problems.

The data indicates that the faculty members faced technological infrastructure-related problems which include problems such as lack of smart boards, lack of computers, uneven bandwidth of internet, slow internet connection, restriction on accessing certain websites. Similar results were found by Ferreira (2019) and Lawrence (n.d) in their study. Vajargah, Jahani, and Azadmanesh (2010) found that the lack of budget in faculties to equip the classes and necessary possibilities of hardware was a very important point. The missing of the technical substructure was also an important point. Opati (2013) pointed out the absence of other support tools like projectors, public address systems, and unstable supply of electricity in lecture halls which ruled out the use of PowerPoint presentations or audio-visual materials. Sheikh and Khoja (2013) found poor/uneven distribution of ICT resources/infrastructure, high ICT expenditure, and lack of money, needing ICT facilities in lecture halls rather than in computer labs. The supporting finding was found in a study by Dange (n.d) that lack of access to ICT equipment. Computer and internet connections were found only in a small number of classrooms, computer labs, and the main library which makes it difficult and inconvenient for the teachers to use ICT in teaching. The research carried out by Reilly (2014) also reported a lack of equipment and infrastructure with which 68.1% of the respondents either agreed or strongly agreed. These highlights that faced non-human resources related problems at a moderate level and the university should take the necessary initiative to solve these problems so that they may have more usage and integration of ICT in their professional work.

4.6.5. Overall Human Resources Related Problems Faced by Faculty Members

Table 72: Frequency and Percentage Distribution of the Faculty Members According to the Human Resources Related Problems Faced by them in Using ICT

(n=290)

Human Resources Related Problems	F	%
More	85	29.3
Moderate	100	34.5
Few	105	36.2
Total	290	100

Table 72 showcases that a higher percentage of the faculty members (36.2%) faced fewer problems related to human resources in using ICT. It is a very good indication that a higher percentage of them faced a few problems. It shows that faculty members might receive enough support from the technical staff of the university. They may be self – efficient in using various ICT tools. Furthermore, the data shows that little less than one third (34.5%) of the faculty members had faced human resources related problems moderately whereas near to thirty percent (29.3%) had more human resources related problems. These may be those faculty members who had less competency in using ICTs, lack of ICT knowledge, and less motivation for using ICT. Their lack of confidence and competency may be the cause of more human resources related problems faced by them.

4.6.4. Differences in the Human Resources Related Problems Faced by Faculty Members in Relation to Selected Variables

Table 73: Differences calculated through t-ration in the Human Resources Problems of ICT in by the Faculty Members in Relation to Selected Variables

(n=290)

Variables	Categories	n	Mean	S.D.	t – Value	Sig.
Opinions towards ICT	Favourable	157	33.44	18.05	-1.42	0.16
	Unfavourable	133	36.09	12.64		
Technological Infrastructure	Good	144	34.12	13.12	0.57	0.57
	Poor	146	35.18	18.14		

*Significant at 0.01

Table 73 portrays the comparative picture of the problems faced by faculty members related to human resources in relation to selected variables. The finding for the same indicated that there were no significant differences in the human resources related problems faced by faculty members concerning their opinions towards ICT and technological infrastructure in the department. It means that human resources related problems did not vary as variation occurs in the opinions towards ICT and technological infrastructure. Thus, the null hypotheses stating that there will be no significant differences in the human resources related problems faced by faculty members in relation to their opinion towards ICT and technological infrastructure were accepted.

Table 74: Analysis of Variance (ANOVA) Indicating Human Resources Problems ICT by Faculty Members in Administration Relation to Selected Variables

(n=290)

Variables	Source of Variance	DF	Sum of Square	Mean Square	F Value	Sig.
Discipline	Between Groups	2	563.05	281.52	1.13	0.33
	Within Groups	287	71842.47	250.32		
Age	Between Groups	2	713.04	356.52	1.43	0.24
	Within Groups	287	71692.47	249.80		
Designation	Between Groups	2	2403.38	600.85	2.45	0.05
	Within Groups	287	7002.13	245.62		
Competency in Using ICT	Between Groups	2	257.68	128.84	0.51	0.60
	Within Groups	287	72147.83	251.39		
Integration of ICT	Between Groups	2	149.94	74.97	0.29	0.74
	Within Groups	287	72255.58	251.76		
Use of ICT	Between Groups	2	1045.46	522.731	2.10	0.12
	Within Groups	287	71360.05	248.64		
Influence of ICT	Between Groups	2	412.70	206.35	0.82	0.44
	Within Groups	287	71992.81	250.85		

*Significant at 0.01

Analysis of variance presented in the above table shows that there were no significant differences in the 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. Thus the null hypotheses stating that there will be no significant differences in human resources related problems faced by faculty members in relation to selected variables were accepted. A contradictory finding was found by Vajargah, Jahani, and Azadmanesh (2010) in their study. They found computer illiteracy especially experienced faculty members and increasing average age was one of the most important barriers in the use of ICT.

Table 75: Item Wise Intensity Indices Showing the Human Resources Related Problems Faced by the Faculty Members in Using ICT

(n=290)

Items	I.I
Lack of training on integrating ICT in teaching	1.82
Lack of support from technical staff for integrating ICT in class	1.80
Lack of skills in using smart boards	1.78
Lack of training on accessing material through H. M. Library Portal	1.70
Uploading document online during promotion made the task more difficult	1.65
Online application restricts to upload certain data (such as details of publications, duties performed, etc)	1.64
Scarcity of authentic Indian resources	1.61
Lack of skills in contacting other researchers online	1.61
Face problem in uploading attachments (such as Pictures) in ARMS	1.59
Uploading online data is time-consuming (such as ARMS, IQAC report, etc)	1.58
Students do not want to learn through ICT	1.57
ICT integration in teaching is not appreciated by the authorities	1.55
Lack of skills in using online application/software in research (such as Mendeley, Google forms)	1.54
Not interested in integrating ICT in teaching	1.54
It is time-consuming to regularly check the university website for any circulars or notice.	1.52
No clear idea on how to integrate ICT in teaching	1.51
Do not understand, how to upload an annual report online	1.48
Face problem in using every icon available on Hansa Mehta Library Portal	1.48
Lack of enough skills for integrating ICT in teaching	1.46
Face problem in finding relevant journal, book related to the topic from Hansa Mehta Library Portal	1.44
Downloading of blank mark list is time-consuming	1.42
Unable to prepare ICT based content in English	1.37

Table 75 indicates 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 fewer problems. It can be seen from the above table that the faculty members faced the following human resources related problems at a moderate level:

- Lack of training on the integration of ICT in teaching
- Lack of support from technical staff for integrating ICT in class
- Lack of skills for using smart boards
- Lack of training on accessing materials through H. M. Library Portal
- Faced difficulties in uploading documents online
- Scarcity of authentic Indian resources
- Unable to contact other researchers online

Furthermore, the listed below are human resources problems faced by faculty members to a lesser extent in using ICT.

- Face problems in uploading attachments (such as Pictures) in Annual Report Management System
- Uploading online data is time-consuming
- Students did not want to learn through ICT
- ICT integration in teaching is not appreciated by the authorities
- Unable to use online application/software in their research
- Not interested in integrating ICT in teaching
- It is time-consuming to regularly check the university website for any circulars or notice.
- No clear idea about how to integrate ICT in teaching
- Not understand, how to upload an annual report online
- Face problem in using every icon available on Hansa Mehta Library Portal
- Not having enough skills for integrating ICT in teaching,
- Face problems in finding relevant journal, book related to my topic from Hansa Mehta Library Portal
- Downloading of blank mark list is time-consuming
- Unable to prepare ICT based content in English

The findings show that faculty members faced problems at a moderate level which were more related to technical aspects and training from a university such as uploading data on the website, online applications, lack of training from university, and library. The problems related to their skills were faced less by them such as no interest in the integration of ICT in teaching, lack of skills using smart boards, unable to use online applications, lack of time, downloading documents from the website. It indicates that faculty members faced more problems related to training and support from the university than their skills and attitude towards ICT.

This finding is supported by Dang (n.d) who discovered similar factors as obstacles to ICT usage such as lack of training, with limited focus on the M.S.Office program and it was found to agree with the findings made by Abbas (2011). He indicates limited resources and facilities, insufficient skills, lack of time for initial preparations, and policymakers little support and encouragement were the most serious problems faced by university teachers in the use of ICTs. The study of Tapera and Kujeke (2019) supported the present results by identifying barriers such as inaccessibility of ICT resources, time constraints, limited technical support, and lack of training. They also found other barriers such as lack of competency, attitude towards use, resistance to change, and personal beliefs. Reilly (2014) also pointed out that the most frequently identified barriers to ICT use in teaching was lack of time to learn with which 69.0% of the respondents either agreed or strongly agreed and lack of effective training with which 61.9% either agreed or strongly agreed. Adegun, Akomolafe, and Adesua (2013) in their study found that domestic pressure, lack of adequate facilities, lack of training, high cost of purchasing ICT tools, poor internet network, poor electric power supply, and non-availability of internet provider constituted challenges to the usage of ICT. A contradictory finding to the present study was found by Shaikh and Khoja (2013) in their study. They found teachers' lack of ICT creativity and willingness to change the running system.

4.7 Influence of ICT

ICT is now considered as a tool for building the knowledge society and particularly as a mechanism at the higher education that could provide a way to rethink and redesign the educational system and processes, thus leading to equal education for all. A teacher professional development is not only enabling teacher educators to understand and use ICT tools in their instructional practices but also understanding how technology is coupled with new approaches to teaching, evaluation, and research. Many teacher educators recognize that and have brought a change in their teaching and research practice. This section presents the influence of ICT on teaching, research, and administrative work of the faculty members.

4.7.1 Overall Influence of ICT on Teaching, Research, and Administrative Work of the Faculty Members

Table 76: Frequency and Percentage Distribution of the Faculty Members According to the Overall Influence of ICT on their Teaching, Research, and Administration Work

(n=290)

Influence of ICT	F	%
High	89	30.7
Moderate	60	20.7
Less	114	48.6
Total	290	100

The findings of the study reveal that little less than half of the faculty members (48.6%) reported overall less influence of ICT on their professional work. It is a surprising finding when a higher percentage of the faculty members integrate and use ICT at a moderate level. The probable reason for this finding could be that the faculty members might be using and integrating ICT as a supplement in their professional work. They might be dependent on it to perform a certain task that needed to use ICT such as preparing a presentation, filling the online annual report, contact staff, and students through an online application. Another reason could be that they might be using it for performing certain tasks only and not in each class, at every stage of research, and for

all administrative works given to them. Moreover, the findings of the present study found that more than forty percent of them had unfavourable opinions towards ICT. Hence, these could be the probable reasons that a higher percentage of them reported overall less influence of ICT on their professional work.

Further, the data also reveals that little less than one third (30.7%) of the faculty members reported a high influence of ICT on their professional work. The probable reason for this finding could be that near to the majority (57%) had favorable opinions towards ICT, forty-nine percent had the good technological infrastructure in their departments, and the majorities (64%) of them were highly and moderately competent in using ICT. Hence all these may lead to the high influence of ICT on their professional work.

Figure 20: Percentage Distribution of the Faculty Members According to the Overall Influence of ICT on their Teaching, Research and Administrative Work

(n=290)

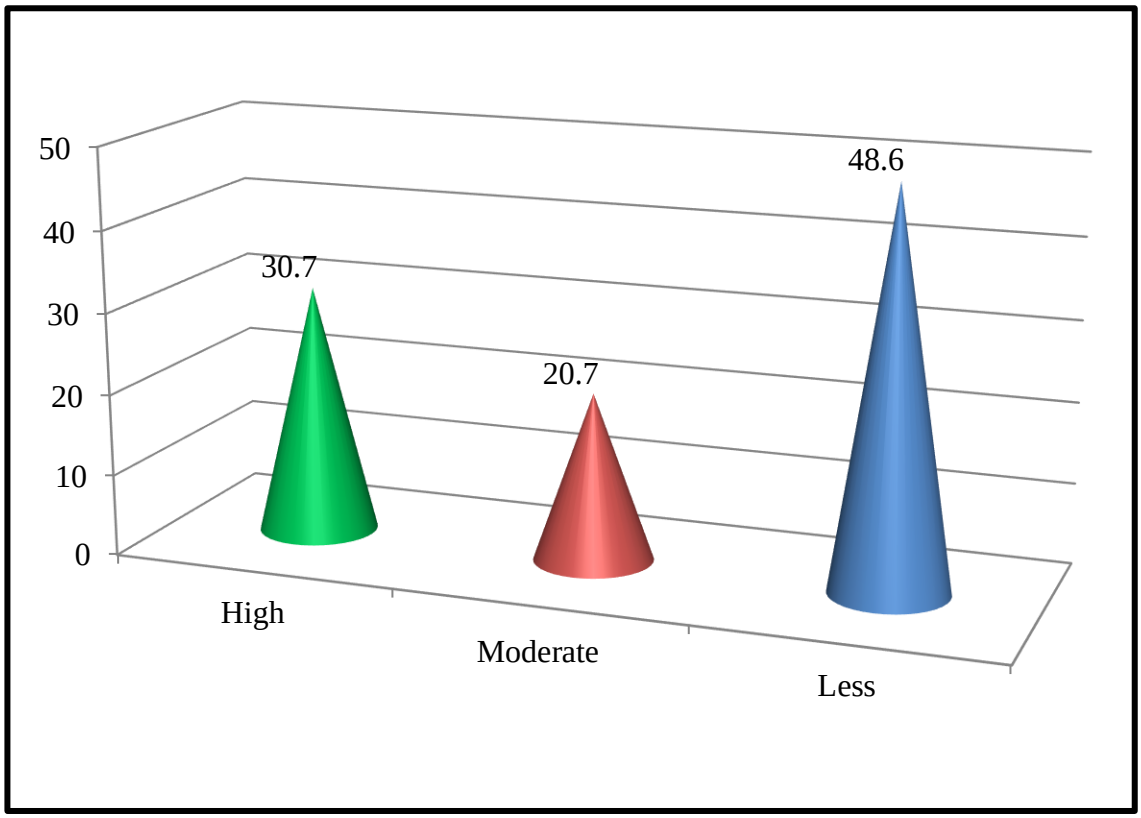


Table 77: Frequency and Percentage Distribution of the Faculty Members According to the Overall Influence of ICT on their Professional Work in Relation to Selected Variables

(n=290)

Variables	n	Influence of ICT					
		High		Moderate		Less	
		f	%	F	%	f	%
Age							
Young Teachers	101	34	33.70	32	31.70	35	34.70
Middle Aged	91	28	30.80	29	31.90	34	37.40
Senior Teachers	98	28	28.60	37	37.80	33	33.70
Discipline							
Science and Technology	136	44	32.40	38	27.90	54	39.70
Humanities	106	27	25.50	45	42.50	34	32.10
Social Science	48	19	39.60	15	31.30	14	29.20
Designation							
Temporary Teaching Assistant	45	15	33.30	17	37.80	13	28.90
Temporary Assistant Professor	94	26	27.70	30	31.90	38	40.40
Assistant Professor	84	30	35.70	24	28.60	30	35.70
Associate Professor	25	8	32.00	9	36.00	8	32.00
Professor	42	11	26.20	18	42.90	13	31.00
Opinions towards ICT							
Favorable	157	41	26.10	46	29.30	70	44.60
Unfavorable	133	49	36.80	52	39.10	32	24.10
Competency in Using ICT							
Less Competent	104	25	24.50	4 3	42.15	34	33.33
Moderate Competent	90	3 0	33.33	2 5	27.77	3 5	38.88
Highly Competent	96	21	21.87	4 2	43.75	33	34.37
Technological Infrastructure							
Good	144	57	39.60	50	34.70	37	25.70
Poor	146	33	22.60	48	32.90	65	44.50

Table 79 reflects that a higher percentage of the faculty members belonging to the following categories of variables reported a moderate level of the overall influence of ICT on their professional work.

- Senior faculty members
- Humanities as their discipline.
- Teaching Assistant, Associate Professors, and Professors.
- Faculty members who had unfavorable opinions towards ICT.
- Faculty members who were highly competent and less competent in using ICT.

Previous findings of the present study highlighted that senior teacher, Assistant Professor, Associate Professor belonging from Humanities, with high competency and unfavourable opinion had overall low integration of ICT. Hence, it is not surprising if they reported an overall moderate influence of ICT as their usage is low then they may not found a high influence of it on their work.

Further, the data presented in the above table reveals that a higher percentage of the faculty members belonging to the following categories reported less influence of ICT on their professional work.

- Middle-aged teachers
- From Science and Technology discipline
- Temporary Assistant Professors, with
- Those had favorable opinions towards ICT
- Moderately competent in using ICT and
- Those who have poor technological infrastructure in their departments

This is a surprising finding that Temporary Assistant Professors, faculty members with favorable opinions towards ICT and from Science and Technology reported less influence when they might be young, more connected to technology, born in the era of technology, with a moderate level of ICT competency and still they found the less influence of ICT on their work. The probable reason for this could be that they might have been working with technology from the beginning of their carrier, they might not have worked more in a traditional way such as visiting the library for preparing teaching materials, teaching through lectures only, manually completing administrative

work, etc. Hence, they may found the less influence of ICT on their professional work as they may have started their professional work through technology only.

4.7.2 Influence of ICT on Teaching Work of the Faculty Members

Table 78: Frequency and Percentage Distribution of the Faculty Members According to the Influence of ICT on their Teaching

(n=290)

Influence of ICT on Teaching	F	%
High	78	26.9
Moderate	111	38.3
Less	101	34.8
Total	290	100

The overall influence of ICT on faculty members' professional work was found less. The above table indicates that near to forty percent (38.3%) of them reported the moderate influence of ICT on their teaching whereas little more than one-forth (26.9%) of them reported the high influence of ICT. It can be considered as a good indication that almost the majority of teachers' teaching is moderately or highly influenced by ICT. It indicates that ICT is effective to bring changes in the pedagogic system to some extent. It shows that faculty members use and integrate ICT as a supplement in their teaching to make their teaching more effective. This finding is supported by the findings found by Egberongbe (2011) that ICT enhanced quality teaching, in the university. ICT adoption enhanced their lecture preparation, lecture delivery, and classroom management. The findings found by Nour (2014) also support the present finding that ICT leads to many positive impacts, opportunities, and advantages. It provided many opportunities for facilitating connection, transformation, and enhancing the production, creation, and transfer of knowledge.

4.7.3 Differences in the Influence of ICT on Teaching in Relation to Selected Variables

Table 79: Differences calculated through t-ration for the Influence of ICT on Teaching of the Faculty Members in Relation to Selected Variables

(n=290)

Variables	Categories	n	Mean	S.D.	t – Value
Opinions towards ICT	Favourable	157	26.23	7.54	-6.67*
	Unfavourable	133	31.57	5.78	
Technological Infrastructure	Good	144	30.56	5.84	- 4.50*
	Poor	146	26.83	8.07	

*Significant at 0.01

Table 79 reflects significant differences in the influence of ICT on teaching concerning faculty members' opinions towards ICT and technological infrastructure. This indicates that the teaching of the faculty members was influenced by the differences in the opinions of the faculty members towards ICT and the availability of technology in the department. The mean scores of the faculty members with unfavourable opinions (31.57) and good technological infrastructure (30.56) were high than those who had favaourable opinions (26.23) and poor technological infrastructure (26.83). It showcases that those faculty members who had unfavourable opinions and good technological infrastructure found more influence of ICT than others. Those faculty members who had good access to technology in their department may more incline to use it. Hence they may found a high influence of ICT. Thus, the null hypotheses stating that there will be no significant differences in the influence of ICT on teaching in relation to their opinions towards ICT and technological infrastructure were not accepted.

Table 80: Analysis of Variance (ANOVA) Indicating Influence of ICT on Teaching of the Faculty Members in Relation to Selected Variables

(n=290)

Variables	Source of Variance	DF	Sum of Square	Mean Square	F Value	Sig.
Discipline	Between Groups	2	447.72	223.86	4.32*	0.01
	Within Groups	287	14889.45	51.88		
Age	Between Groups	2	56.26	28.13	0.53	0.59
	Within Groups	287	15280.92	53.24		
Designation	Between Groups	2	29.23	7.31	0.14	0.97
	Within Groups	287	15037.95	53.71		
Competency in Using ICT	Between Groups	2	2096.69	1048.34	22.72*	0.01
	Within Groups	287	13240.48	46.13		
Integration of ICT	Between Groups	2	1721.43	860.71	18.14*	0.01
	Within Groups	287	13615.75	74.44		
Problems in the use of ICT	Between Groups	2	16.79	8.39	0.16	0.85
	Within Groups	287	15320.39	53.38		
Use of ICT	Between Groups	2	1557.24	778.62	16.22*	0.01
	Within Groups	287	13779.94	48.01		

*Significant at 0.01

Table 80 shows the ANOVA results for the influence of ICT on the teaching of the faculty members concerning selected variables. The findings of the study indicate that there was no significant difference in the overall influence of ICT on the teaching of the faculty members concerning 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. Hence, the null hypotheses stating that there will be no significant differences in the influence of ICT on teaching in relation to their age, designation, and problems in the use of ICT were accepted. Table 80 further showed significant differences in the influence of ICT on the teaching of faculty members concerning their disciplines, competency in using ICT, integration of ICT, and the use of ICT. Thus, the null hypotheses stating the same with these variables were not accepted.

Table 81: Tukey's HSD Comparison for Influence of ICT on Teaching of the Faculty Members in Relation to Selected Variables

Variable	I	Mean (I)	J	Mean (J)	Mean DF (I – J)	SE	Sig.
Discipline	Social Science	31.46	Science and Technology	28.02	3.43*	1.20	0.01
		31.46	Humanities	28.26	3.19**	1.25	0.03
ICT Competency	Moderately	31.24	Less	25.13	6.11*	0.99	0.01
	Highly	30.11		25.13	4.98*	0.96	0.01
Integration of ICT	Moderate	29.31	Low	25.58	3.73*	0.98	0.01
	High	31.41		25.58	5.83*	0.98	0.01
Use of ICT	Medium	29.91	Low	25.44	4.46*	0.99	0.01
	High	30.71		25.44	5.26*	0.99	0.01

*Significant at 0.01, **Significant at 0.05

Table 81 shows the significant differences in the influence of ICT on the teaching of the faculty members that existed between the variables by comparing their means. It highlighted that those faculty members who belong to the discipline of Social Science (31.46), with moderate (31.24; p=.01)) and high (30.11; p=.01) competency in using ICT, had moderate (29.91; p=.01) and high (30.71; p=.01) usage of ICT, integrate ICT highly (31.1; p=.01) and moderately (29.31; p=.01) reported the high influence of ICT on their teaching comparison to those who were from Science and Technology (28.02; p=.01), Humanities (28.26; p=.03), had less competency (25.13), low usage (25.58) and integration (25.44) of ICT. The possible reason for this finding could be that if faculty members use and integrate ICT in their teaching than only they will find the influence of it on their teaching. Similarly, as competency increases, use, and integration increase so it may influence teaching. Faculty members from Science and Technology may be more associated with technology in their profession so they might not find more influence of ICT on their teaching but on other hand, faculty members form Social Science deal more with society and also reported high usage of ICT for their work, therefore, they might have found more influence of ICT on their teaching. ICT may be helping them in making the course curriculum more interesting. ICT may be enhancing

their outreach activities and serving them in contacting members of the society. Hence, they might have found more influence of ICT on their teaching.

4.7.4 Item Wise Intensity Indices for Influence of ICT on Teaching Work of the Faculty Members

Table 82: Item Wise Intensity Indices Showing Influence of ICT on Teaching of the Faculty Members

(n=290)

Items	I.I
Lectures become more interesting to the students	2.41
Produced effective teaching material for a class like a pamphlet	2.40
Students participate more efficiently in class	2.36
Work efficiency as a teacher is raised	2.34
Encouraged for teaching more enthusiastically in the class	2.33
Course content becomes live in the class	2.33
Sharing of teaching notes with the students become easy	2.33
The way students learn in class is changed. (more active and attentive)	2.19
Teaching satisfaction is raised	2.17
Physical visit to the library for gathering content related to subjects is restricted	2.15
Lecture preparation time has reduced	2.10
Students cut and paste the material provided by the teachers to them	1.89
Lecture becomes monotonous	1.67

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. Table 84 shows that the item-wise intensity indices for the influence of ICT on the teaching of faculty members varied from 2.41 -1.67. It further indicates that faculty members agreed to a great extent for the following matters related to the influence of ICT on their teaching.

- The lectures become more interesting to the students.
- Produces effective teaching materials for a class such as pamphlets.
- The participation of students is more efficient in the classroom.
- The work efficiency of the faculty members is raised.
- Encouraged for teaching more enthusiastically in the classroom.
- Course content becomes live in the class (Such as Sharing of pictures and videos through PPT).
- Sharing of teaching materials with the students become easy

These portrayed that faculty members found that ICT had changed their teaching, made it more interesting, encouraged them for teaching enthusiastically, and they were able to produce more and effective teaching materials for the class. These findings are supported by the findings found by Ezengbor (n.d) that ICT improved lesson delivery, enhanced students understanding of the lesson, planning lesson environment, and minimizing theme waste in developing problem-solving skills in the students. ICT enhanced teachers' efficiency in classroom teaching, and their communication with students. Reilly (2014) found that faculty members strongly agree that technology use fosters an effective teaching and learning environment and that technology provides greater access to learning resources. In the present study faculty members also reported a similar influence of ICT. It shows that ICT has enhanced the quality of teaching at the university. This is a welcoming development since teachers' perception; lecture delivery and classroom management have been perceived by lecturers as being enhanced greatly by ICT adoption. The possibility for this finding could be that faculty members use ICT such as projector, PowerPoint, and similar packages to enhance their lecture delivery. Mahat, Jamsandekar, and Nalavade (2012) pointed out in their study that effective ICT teaching methods increase student engagement in the class and reduce teaching time. Their study understands ICT is essential in designing effective computer-related courses. The finding was supported by findings of Nour (2014) as she suggests that ICT leads to many positive impacts, opportunities, and advantages. ICT provides many opportunities and advantages for facilitating connection and transformation and enhancing the production, creation, and transfer of knowledge.

However, their agreement for negative items listed under table 82 showed less influence of ICT on them. These items were

- Students cut and paste the material provided by the teachers to them.
- Lectures become quite monotonous.

It can be inferred from the present findings that faculty members did not found a complete negative influence of ICT on their teaching like their lectures become monotones and students cut and paste materials shared by them. The present finding supported by the result of Reilly (2014) who observed that most respondents' disagreed that technology creates learning problems, takes time away from classroom instruction, and slows the teaching process.

4.7.5 Influence of ICT on Research Work of the Faculty Members

According to Bala and Rani (2018), the rapid development of ICT, particularly the internet is one of the most fascinating phenomena characterizing the information age. ICT powers our access to information, entertainment, and education. The application of ICT in academic research has grown steadily in the past ten to fifteen years in both developing and developed countries. Another important dimension of ICTs in research is the use of online full-text databases and online research libraries/virtual libraries. The present study also analyzes the influence of ICT on research work carried out by faculty members. The results related to these findings are discussed here.

Table 83: Frequency and Percentage Distribution of the Faculty Members According to the Influence of ICT on their Research

(n=290)

Influence of ICT on Research Work	F	%
High	83	28.6
Moderate	106	36.6
Less	101	34.8
Total	290	100

The findings of the study highlighted that a higher percentage (36.6%) of the faculty members reported a moderate influence of ICT on their research work whereas little less than thirty percent (28.6%) of them reported a high influence of ICT. This shows that the majority of them observed moderate to high influence of ICT on their research

work. The probable reason for this finding could be that applications of ICTs are particularly powerful and uncontroversial in higher education research functions. The steady increases in bandwidth and computing power available have made it possible to conduct complex calculations on large sets. Communication links make it possible for faculty members to spread across the world instead of concentrated in a single institution. The combination of communications and digital libraries is equalizing access to academic resources, greatly enriching research possibilities for smaller institutions. The faculty members must have realized all these benefits of ICT in their research work, and therefore they may have reported a moderate level of influence of ICT on their research work.

The findings of the study further reveal that little more than one third (34.8%) faculty members found less influence of ICT on their research work. The findings of the present study indicate that a higher percentage of the faculty did not use online resources, a database provided by the university library as well as other internet-based ICT tools. So, this can be the reason for less influence of ICT on their research work. Another possible reason could be that faculty members make physical visits to the university library to access the literature and this might be limiting their use of ICT. Hence, they may found less influence of ICT on their research work.

4.7.6 Differences in the Influence of ICT on Research Work of the Faculty Members in Relation to Selected Variables

Table 84: Differences calculated through t-ration in the Influence of ICT on Research of the Faculty Members in Relation to Selected Variables

(n=290)

Variables	Categories	n	Mean	S.D.	t – Value
Opinions towards ICT	Favourable	157	30.34	13.61	-2.12
	Unfavourable	133	33.19	8.06	
Technological Infrastructure	Good	144	32.54	7.39	-1.32
	Poor	146	30.76	14.39	

*Significant at 0.01

Table 84 shows the differences in the influence of ICT on the research work of the faculty members with selected variables. The differences were not found in the influence of ICT on the research work of the faculty members concerning their opinions towards ICT and technological infrastructure in the department. This indicates that variation in opinions and technological infrastructure were not the reasons for the influence of ICT on their research work. Hence, the null hypotheses stating that there will be no significant differences in the influence of ICT on the research work of the faculty members concerning their opinions towards ICT and technological infrastructure were accepted.

Table 85: Analysis of Variance (ANOVA) Indicating Influence of ICT on Research of the Faculty Members in Relation to Selected Variables

(n=290)

Variables	Source of Variance	DF	Sum of Square	Mean Square	F Value	Sig.
Discipline	Between Groups	2	80.14	40.07	0.19	0.82
	Within Groups	287	58382.27	204.13		
Age	Between Groups	2	240.96	120.48	0.59	0.55
	Within Groups	287	58221.46	203.57		
Designation	Between Groups	2	1109.26	277.32	1.37	0.24
	Within Groups	287	57353.15	201.95		
Competency in Using ICT	Between Groups	2	3076.92	1538.46	12.62*	0.01
	Within Groups	287	34995.49	121.94		
Integration of ICT	Between Groups	2	14765.07	7382.54	90.91*	0.01
	Within Groups	287	23307.34	81.21		
Problems in the use of ICT	Between Groups	2	140.09	70.05	0.53	0.59
	Within Groups	287	37932.32	132.17		
Use of ICT	Between Groups	2	2938.57	1469.28	12.00*	0.01
	Within Groups	287	35133.85	122.42		

*Significant at 0.01

The findings reveal that there were no significant differences in the influence of ICT on faculty members' research work concerning their discipline, age, designation, and problems in the use of ICT. This indicates that discipline wise, age-wise, designation

wise, and problems wise no variations occur in the influence of ICT on their research work. Therefore, the null hypotheses stating there will be no significant differences in the influence of ICT on research work of faculty members concerning their discipline, age, designation, and problems in the use of ICT were accepted. Further, the significant differences were found in the influence of ICT on their research work with their competency in using ICT, the overall integration of ICT, and the usage of ICT. The data was further analyzed to find out which variables vary and it is presented in the below table.

Table 86: Tukey's HSD Comparison for Influence of ICT on Research Work of the Faculty Members in Relation with Selected Variables

Variable	I	Mean (I)	J	Mean (J)	Mean DF (I – J)	SE	Sig.
ICT Competency	Moderately	33.80	Less	27.30	6.50	1.59*	0.01
	Highly	34.33			7.04	1.56*	0.01
Integration of ICT	Moderate	31.81	Low	23.24	8.57	1.28*	0.01
	High	40.61			17.37	1.28*	0.01
		40.61	Moderate	31.81	8.79	13.1*	0.01
Use of ICT	High	35.91	Low	28.23	7.68	1.59*	0.01
		35.91	Moderate	28.23	5.06	1.59**	0.05

*Significant at 0.01, **Significant at 0.05

The findings of the post hoc show that high and moderately competent faculty members reported the high influence of ICT on their research work than the less competent faculty members. This indicates that as competency level increases it highly influences the research work carried out by the faculty members. The competency of faculty members is directly related to their perceptions of their ability to use ICT in their research work. Therefore, the difference might have been found between moderate, high, and less competent faculty members. Thus, the null hypothesis stating that there will be no significant difference in the influence of ICT on the research work of the faculty members in relation to their competency in using ICT was not accepted.

Table 86 shows that faculty member who had moderate integration (31.81; p=.01) had high influence than who had low integration (23.24) of ICT. Moreover, it also highlighted that those faculty members who had high integration (40.61) reported high influence than those had moderate (31.81, p=.01) and low (23.24, p=.01) integration. It shows that ICT influenced the research work of the faculty members who had high and moderate integration than their counterparts. The probable reason for this finding could be that ICT integration may have improved quality, reduced complexity, as well as lower the cost of their research. Therefore they may found more influence on their research work. Hence, the null hypothesis stating that there will be no significant difference in the influence of ICT on the research work of faculty members in relation to their integration of ICT was not accepted.

Further, the data also indicates a significant difference between the influences of ICT on their research work concerning the use of ICT. Faculty members who use ICT at a high level were found more influence of it on their research work than their peer group. The use of ICT has increased the speed of research, accessibility to literature, and knowledge contribution within the research community. ICT also improved research quality and accuracy. Faculty members who had high usage of ICT may also observe these and therefore they may have reported high influence than their counterparts. Thus, the null hypothesis stating that there will be no significant difference in the influence of ICT on research work concerning their use of ICT was not accepted.

4.7.7 Item Wise Intensity Indices for Influence of ICT on Research Work of the Faculty Members

Table 87: Item Wise Intensity Indices Showing Influence of ICT on Research Work of the Faculty Members

(n=290)

Items	I.I
Submissions of research papers for publication become easier	2.72
Research work becomes faster (like quick data analysis through data analysis software)	2.68
Writing a review of literature becomes very fast (through online resources)	2.67
Research work becomes easier (like quick access to other university library material)	2.66
Access to own research data any time and from any place becomes easier	2.65
Finding and submission of research proposals to funding agency become easy	2.65
Contact with other researchers, who are working in the same research area has increased	2.60
The storage of large research data becomes easier	2.57
Referencing work becomes more easy and fast through reference managing software	2.47
Clarity of research related confusions becomes easier through online discussion with other researchers	2.42
Data collection from distance becomes easier through web-based data collection applications	2.39
Frequent visit to the library is reduced	2.36
The data collection process becomes tedious as the sample does not fill online forms timely	2.09
Do not get authentic online material related to their research	2.03

The overall intensity index for the influence of ICT on research was 2.49. This reflects that faculty members had an overall moderate influence of ICT on their research work. Table 89 shows the item-wise intensity indices for the influence of ICT on the research work of faculty members ranged from 2.72-2.03. It further indicates that faculty members reported a high level of agreement for the following matters:

- Submissions of research papers for publication have become easier.
- Research work becomes faster and easier.
- Writing a literature review becomes very fast.
- Access to one's research data at any time and any place becomes easier.
- Finding and submission of research proposals to funding agencies become easier.
- To contact with other researchers who are working in a similar research area
- The storage of large research data becomes easier.
- Referencing work becomes more easy and fast through reference managing software.
- Clarity of problems related to research becomes easier through online discussions with other researchers.
- Data collection from distance becomes easier through web-based data collection applications.

This shows that ICT had influenced the research work of the faculty members such as the submission process of research papers become easier, made their research work faster and easier, made data collection, and processing easier and faster. The findings were supported by the findings of Ezeugbor(n.d) which also highlighted the use of ICT by teachers enhanced their efficiency in research work and publications by publishing journal articles through the web, accessing the internet for international conferences and making a connection and collaborations with other researchers worldwide. This is not surprising because the use of the internet enables teachers to download current materials, and access information via the internet. Research materials such as books, journals, newspapers, magazines can be accessed online and exchanged through e-mail. These findings tend to be heavily reflected in the observations of Nour (2014) when she noted that ICT increased the creation and transfer of knowledge, increase the possibility of research outside academic fields, increase free access to electronic publications for

academic purpose and create linkage and contact among people with a common interest in different activities related to increase of knowledge. However, faculty members reported less influence for the statement that the data collection process becomes tedious as the sample does not fill online forms timely (2.09) and they do not get authentic online materials related to their research (2.03). It can be inferred from the present findings that faculty members found a more positive influence of ICT on their research work.

4.7.8 Influence of ICT on Administrative Work of the Faculty Members

Administrative services in higher education institutes take care of various activities such as accounts, management of students' data, and general administration. Administration involves various activities starting from the admission process through learning activities to processing and release of results. These administrative works are found to have enhanced greatly under the application of ICT. ICT might have brought changes in the administrative activities carried out by faculty members. Therefore the present study investigates the influence of ICT on the administrative work of the faculty members and results are discussed in this section.

Table 88: Frequency and Percentage Distribution of the Faculty Members According to the Influence of ICT on their Administration Work

(n=290)

Influence of ICT on Administration Work	Frequency	Percentage
High	9	3.10
Moderate	184	63.4
Less	97	33.4
Total	290	100

The findings of the study reveal that the majority (63.4%) of the faculty members reported a moderate influence of ICT on the administrative work carried out by them. ICT helps to reduce difficulties and strengthen the overall administration of higher education. ICT plays a significant role in supporting powerful, efficient management and administration in the education sector. ICT application leads to changes in the way universities carry out activities and had an impact on the educational administrative

process and management of the university. In line with this, The Maharaja Sayajirao University of Baroda also initiated paperless work and work related to the staff and student management done online now. From admissions to the declaration of results, everything is done online. Faculty members also need to fill their self-appraisal; annual reports and even applications for the appointments are done online. The faculty members need to use ICT to perform their administrative duties and hence they may have reported a moderate influence of ICT on their administrative work.

Further, the data also reveals 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. The probable reason for these findings could be that either these faculty members were newly appointed or near to their retirement hence, they may have less administrative duties where they need to use ICT. Therefore, they may found less influence of ICT on their administrative work. These faculty members may be from the senior teachers who had fewer competencies in using ICT. Hence they may found less influence.

4.7.9 Differences in the Influence of ICT on Administrative Work of the Faculty Members in Relation to Selected Variables

Table 89: Differences calculated through t-ration in the Influence of ICT on Administration Work of the Faculty Members in Relation to Selected Variables

(n=290)

Variables	Categories	n	Mean	S.D.	t – Value
Opinions towards ICT	Favourable	157	28.85	12.27	-1.52
	Unfavourable	133	29.68	7.14	
Technological Infrastructure	Good	144	29.13	7.48	-0.71
	Poor	146	28.17	12.43	

*Significant at 0.01

The calculated t-ration indicated no significant differences in the influence of ICT on the administrative work of the faculty members concerning their opinions towards ICT and technological infrastructure. It shows that opinions and technological infrastructure were not the reasons nor the barriers in the influence of ICT on administrative work carried out by the faculty members. The majority (63%) of the faculty members

reported moderate influence and here no difference was found concerning technological infrastructure. It shows that faculty members with poor technological infrastructure in the department also completed their administrative work. They may use their laptops or smartphones to complete their administrative work as it is the completion to do it on time. Hence, the null hypotheses stating that there will be no significant differences in the influence of ICT on administrative work concerning their opinions towards ICT and technological infrastructure were accepted.

Table 90: Analysis of Variance (ANOVA) Indicating Influence of ICT on Administration Work of the Faculty Members in Relation to Selected Variables

(n=290)

Variables	Source of Variance	DF	Sum of Square	Mean Square	F Value	Sig.
Discipline	Between Groups	2	156.32	78.16	1.67	0.19
	Within Groups	287	13448.39	46.86		
Age	Between Groups	2	164.67	82.34	1.76	0.17
	Within Groups	287	13440.03	46.83		
Designation	Between Groups	2	95.59	23.89	0.50	0.73
	Within Groups	287	13509.12	47.40		
Competency in Using ICT	Between Groups	2	2261.61	1130.80	11.52*	0.01
	Within Groups	287	28176.08	98.17		
Integration of ICT	Between Groups	2	10437.11	5218.55	74.88*	0.01
	Within Groups	287	20000.58	69.69		
Problems in the use of ICT	Between Groups	2	97.32	48.66	0.46	0.63
	Within Groups	287	30340.36	105.72		
Use of ICT	Between Groups	2	2127.62	1063.81	10.78*	0.01
	Within Groups	287	28310.07	98.64		

*Significant at 0.01

The results of the analysis of variance portray statistically significant differences in the influence of ICT on administrative work carried out by the faculty members concerning their competency in using ICT, integration of ICT, and the use of ICT. Further, the data presented in the above table shows no differences in the influence of ICT on the administrative work of the faculty members concerning their discipline, age,

designation, and problems faced by them in using ICT. Certain duties such as filling of self-appraisals, annual reports, student admissions, and examination duties need to be performed by all the faculty members irrespective of their age, designation, and discipline. Therefore the difference may not be found in these variables. Hence, the null hypotheses stating that there will be no significant difference in the influence of ICT on administrative work concerning their age, designation, discipline, and problems were accepted.

Table 91: Tukey's HSD Comparison for Influence of ICT on Administrative Work of the Faculty Members in Relation with Selected Variables

Variable	I	Mean (I)	J	Mean (J)	Mean DF (I – J)	SE	Sig.
ICT Competency	Moderately	31.23	Less	24.99	6.24*	1.43	0.01
	Highly	30.32		24.99	5.53*	1.40	0.01
Integration of ICT	Moderate	29.74	Low	21.24	8.51*	1.19	0.01
	High	35.73		21.24	14.49*	1.19	0.01
			Moderate	29.74	5.98*	1.21	0.01
Use of ICT	Moderate	29.78	Low	24.98	4.80**	1.14	0.02
	High	31.34		29.98	6.36*	1.43	0.01

*Significant at 0.01, **Significant at 0.05

The findings of the study reveal that faculty members who had moderate and high competency in using ICT reported a high 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 had low integration of it. Even the findings of the study also reveal the difference between the faculty members who highly integrate it than those who moderately integrate it. It means those integrate ICT at a high level may found more influence than those integrate it at a moderate level. Further, the data also reveals that those faculty members who had high and moderate usage of ICT reported more influence than those who had low usage of it. It again shows that as competency, integration, and use of ICT increases the level of influence also increases. Hence, the hypotheses stating that there will be no significant differences in the influence of ICT

on administrative work of the faculty members concerning their competency in using ICT, integration of ICT, and use of ICT were not accepted.

4.7.10 Item Wise Intensity Indices for Influence of ICT on Administration Work of The Faculty Members

Table 92: Item Wise Intensity Indices Showing Influence of ICT on Administration Work of the Faculty Members

(n=290)

Items	I.I
Administration work becomes faster (Such as result generation, storage of students record)	2.80
Coordination with staff members through e-mail/WhatsApp becomes easier.	2.78
Work distribution amongst the staff members through e-mail or intranet becomes easier.	2.76
Value to paperless work is added.	2.75
Routine work (Such as circulation of circulars/reminder) becomes easier	2.71
Communication with teaching and non-teaching staff becomes faster through e-mail.	2.71
Availing documents legal/professional becomes easier (taking 16A form)	2.69
Privacy is improved through online applications (Such as circular through e-mail)	2.65

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 among faculty members become easier, and it adds value to the paperless work. These findings were supported by the results found by Juma, Raihan and Clement (2016) who reported that ICT was relevant in facilitating effective and quick decision making, improving coordination of tasks and activities, enhancing effective communication and knowledge sharing. Ezeugbor (n.d)

observed that the management of students' records and data, preparing and processing of tests and examination, marking, recording, and safeguarding of students' results were all perceived by lecturers to have become more effective and better enhanced through ICT. These findings are consonance with the findings of Pohekar (2018) that ICT was extensively used for accounts-related, clerical general administrative duties in the university. Applications and admissions were conducted online and applicants could check their admission status anywhere. Generally, from the admissions, registrations, and fee payments appeared to be the major areas ICT has gained ground and impacted on administrative services/management of students' records in Indian universities.

4.8 Suggestions for Integration of ICT in Teaching, Research, and Administrative Work

The information and communication technologies have saved a lot of time and resources and have brought accuracy and efficiency in the university system. The university has made many changes in the traditional setup to make it more effective and to improve the integration of ICT in university. Certain suggestions were given by the faculty members for more integration of ICT. This section presents the suggestions given by the faculty members for the same.

4.8.1 Suggestion for Integration of ICT in Teaching

- Access of certain websites is restricted through a university internet connection which limits the use of ICT, so these kinds of restrictions 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 faculty members for the maximum use of ICT in the classrooms.
- University needs to emphasize more on the adoption of ICT amongst the teaching fraternity for the teaching process.
- More computers and LCD projectors are needed in the faculties.
- The use of ICT should be made compulsory in classrooms at least once a week.

- More workshops related to the use and integration of ICT in classroom teaching should be conducted regularly.
- Faculty members should avoid many dependencies on readymade materials (such as slides)
- Reliable resources on the internet should be used.
- Less administrative work to concentrate more on teaching with ICT.
- 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.

4.8.2 Suggestions for Integration of ICT in Research

- Equipment such as 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, and Prism should be provided and training for using this software should be provided. More awareness regarding 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 faculty members. More research platforms should be 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 are 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.

4.8.3 Suggestions for Integration of ICT in Administrative Work

- Necessary ICT related equipment needs to be provided in working conditions.
- Training should be provided on the use and importance of ICT to the administrative staff with sufficient resources (ICT).
- There should be less paperwork.
- Teachers should be less involved in administration activities.
- Quite often the web portals do not work efficiently that should be solved.
- Various activities should be made 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.
- There should be separate administrative staff and ICT should be taught to them for their admin work. Teachers should not be involved in admin work even if ICT is integrated.
- Complete digitalization should be encouraged as many tasks (like applications for requirement) require soft copies as well as hard copies, 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 efficiently to use available computers.
- The latest software and operating systems should be uploaded on the computers.

- 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.
- Many reports are now being generated online but university administration can go online for self-appraisal and some other works such as grade submission that will be easier if it becomes online
- Most of the faculty members do not have efficient knowledge in handling administrative works. Need to upgrade the extent of ICT to a great extent to increase efficiency in work. It can increase their skills and higher performance for future growth. They should not confine only to stereotype skills - office, MS word only. New software needs to be aware to save time and also increase efficiency.
- Administrative staff should be made aware of the benefits of using ICT in their work by conducting seminars, workshops for them.

4.9 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.

4.10 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 up 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.
7. A study on ICT usage and its' influence amongst the teachers and students during COVID 19 can be carried out.