



IMPACT OF COVID-19 IN PUNE UG PG PROGRAMMES WITH MAJOR PARADIGM SHIFT

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Abstract

Covid-19 pandemic impacted nearly every sector and part of world. Education is also one of those fields which was severely got effected. This research paper highlights the paradigm shift observed between conventional teaching and online teaching before and after arises of Covid-19 pandemic situation. It also focuses on problems faced by teachers/instructors, parents and students during pandemic. The study investigated pre impact and post impact of pandemic in the education sector. We used Survey questions to collect data of demographic details, technical requirements about online classes, Online learning Benefits, Problems and Offline learning Benefits. Our Study also presents scenarios relevant to Evaluation done in undergraduate and postgraduate (UG and PG) programmes of SPPU, Pune. Resultant Study tests hypothesis developed using Chi-square test. This study revealed that Students prefer Offline learning System more compared to Online learning System. Calculated value of chi-square for Offline learning Benefits is 192.12, Online learning Problems is 174.39 and Online learning Benefits is 96.13 which much higher than critical value table for 18, 8 and 4 degree of freedom at 5% significance level 9.390, 2.733, and 0.711 respectively.

Keywords: e-learning, Challenges and Opportunities in Online Teaching, Impact of Crises for Future Teaching and Learning

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1. INTRODUCTION:

Education is one of the main impacted sector due to Covid-19. In India from 24th March 2020 Prime Minister Shri Narendra Modi announced total LOCKDOWN ANNOUNCED. (PIB, 2020) This LOCKDOWN was ANNOUNCED to avoid rapid spread of CORONA virus at ground level. This result in Universities, colleges and schools closed with immediate effect and stopped face to face teaching. Nationwide colleges and schools who use the traditional teaching method of teacher and students by using chalk duster were halted. Social distancing and restrictions in movement policies affected the calendar of academic programs pre-scheduled and learning of the students was halted. In pandemic to find solution many educational leaders came together for keeping education intact and they started implementing different efforts with technical solutions.(OECD, 2020) Among these solutions one is to use digital medium and devices such as laptops, tablets and mobile phones. MHRD MINISTRY OF HUMAN RESOURCE DEVELOPMENT started many channels on radios and televisions for learning. Real-time teaching used online free or paid platforms like zoom meeting , Google meet, Microsoft teams; Online instructional resources are used which includes multimedia contents, e-books, videos etc. such as KHAN ACADEMY, GOOGLE DOCS, YOUTUBE, MICROSOFT TEAMS etc. Thus there is paradigm shift to digital learning from conventional teaching methods. Before COVID also in teaching use ICT Information and Communication Technology was playing important role, teachers were using many language applications like Duolingo for English, virtual education, online video conferencing , online learning software, after Covid-19 there was sudden surge. The study reviews literature of impact of COVID-19 on education outside India and

in India. “Zamira Hyseni Duraku presented the research findings on the impact of COVID-19 on education and the well-being of teachers, parents, and students in Prishtine Kosove in Southeast Europe.(Duraku & Hoxha, 2021) Schleicher, Andreas presented report of the impact of covid-19 in OCED countries which is a group of members of the Organisation for Economic Co-operation and Development (OECD) are typically democratic countries that support free-market economies. Study highlighted on finance for education, movement of students, teacher students preparation to face Covid-19 situation.(Schleicher, 2020) Mehtap performed study and investigated the impact of COVID-19 period on education systems and institutions in Turkey.(Mehtap SÜT & Öznaçar, 2017) Pham, Hiep Hung discussed the impact of the COVID-19 global pandemic in Vietnamese universities and outlined use of technology in Post COVID environment.(Pham & Ho, 2020) Fernando Reimers in research report provided a framework to support education leaders educational governance to formulate policies during Pandemic for OCED in Module 1 and in Module 2 presented set of online educational resources to support the continuity of teaching and learning during COVID-19 Pandemic. (F. Reimers et al., 2020)(F. M. ve S. Reimers, 2020) Galina Ilieva in their study presented effects of covid 19 in Plovdiv University Bulgeria proposed framework to improve higher education.(Ilieva et al., 2021) Sumitra Pokhrel and Roshan Chhetri written research article “A Literature Review on Impact of COVID-19 Pandemic on Teaching and Learning _ Enhanced Reader” which summarized details of impact of covid-19 on teaching learning in Bhutan.(Sumitra Pokhrel and Roshan Chhetri, 2021) Amreen Bashirin their study in UK for Biosciences students presented post Covid adaptations.(Bashir et al., 2021) Ms. Ulfat Amin presented research results about Comparative Study

on Effectiveness of Online and Offline Learning among Higher Education Students in Kashmir.(Amin et al., 2022) Panagiotis Photopoulos in his publication attempts to present that technology not make working life better, but in post-Covid19 will open the ways for taking advantage of the new technologies in educational landscape. (Photopoulos et al., 2021) Dr.M.Neelavathy identified in study in effect of pandemic on attitudes of students towards e-learning in Madurai District.(Neelavathy, 2020) T. Muthuprasad studied Student's perception and preference towards the online learning for agriculture students in India.(Muthuprasad et al., 2021) MOHANKUMARI C in their study presents findings majority of the student's preferred face-to-face learning. Most of the students find it difficult to cope up with technology-aided learning have a negative attitude towards E-

learning.(MOHANKUMARI C & JAYA SHRI R R, 2022)"

Systematic acquisition and assessment of above review information helped in formulating objectives of research work as a) To test hypothesis using Survey research methodology, hypothesis is formulated as "Students prefer offline learning System more than online learning System", tested and proved in Section I b) To identify the challenges and perception towards online and offline teaching learning during covid-19 by the students and teachers. Related work and Online Evaluation of Students, Scenario of Evaluation by SPPU, Pune, and Procedure for Online Exam is presented in section II. In last section concluded findings and suggestions for future teaching and learning process from survey are presented by researcher.

The study structure is as shown in diagram below

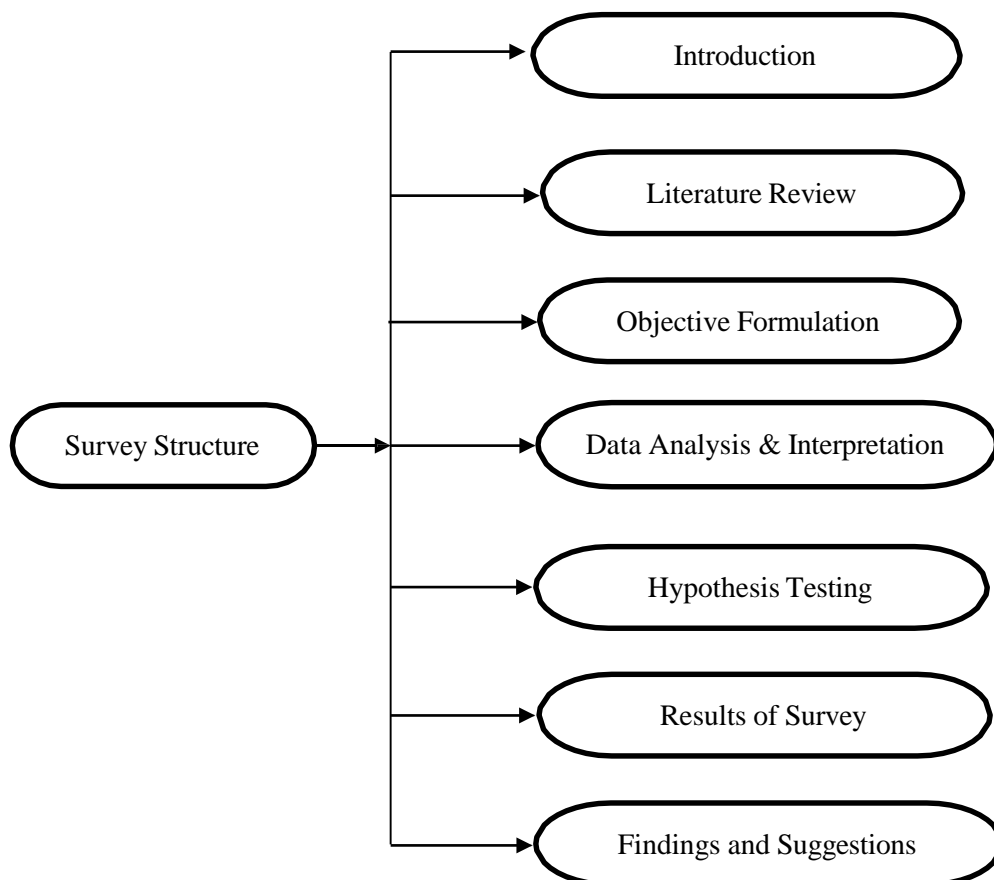


Figure 1 Survey Structure

2. RESEARCH METHODOLOGY

The primary data was collected using questionnaire from 231 students who were selected on the basis of random sampling technique. Using Google form online data was collected using a survey method from different sections and levels of the education institute. Target population was students from Pune in Maharashtra State of India.

Section I

Data Analysis and Interpretation

Survey questions collect data of demographic details, technical requirements about Online classes, Online learning Benefits, Problems and Offline learning Benefits and identifies impact of pre and post covid-19 learning and its impact on students.

1. Demographic characteristics:

Data collected using Google form contains demographic characteristics, age group, gender, and educational qualification, stream of study, residential area and gross monthly income of the family in table below having N =231.

Demographic variable		Number	Percentage
Gender	Male	120	51.95
	Female	111	48.05
Age	Below 22	199	86.15
	Above 22	32	13.85
Qualification	UG	183	79.22
	PG	42	18.18
	Doctorate	1	0.43
	Other	5	2.16
Programme of Study	Science	121	52.38
	Engineering	46	19.91
	Commerce & Management	44	19.05
	Other	20	8.66
Residential Area	Urban	166	71.86
	Rural	65	28.14
Gross Monthly Income of Family	< 40000	86	37.2
	40000 – 70000	66	28.6
	70000- 1lakh	33	14.3
	Above 1 lakh	44	19

Table 1 Demographic Characteristics

Demographic characteristics consisting of 231 of respondents out of which 51.95 % were male and 48.05% were female as shown in Figure 2 below.

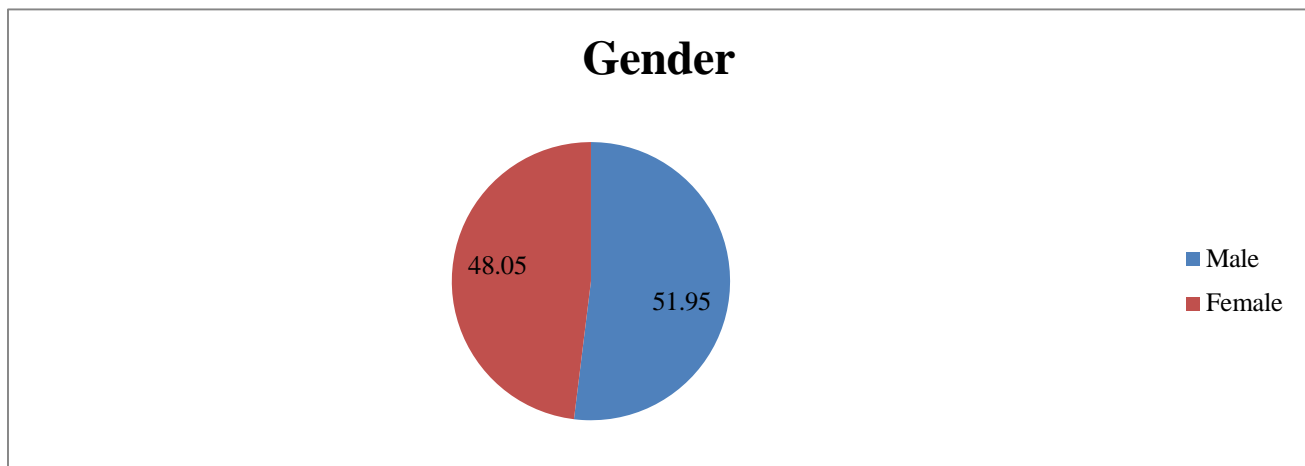


Figure 2 Pie chart showing students 's Gender Distribution

86.15% students age was below 22 and 13.85 % students were above 22 as shown in pie chart Figure 3

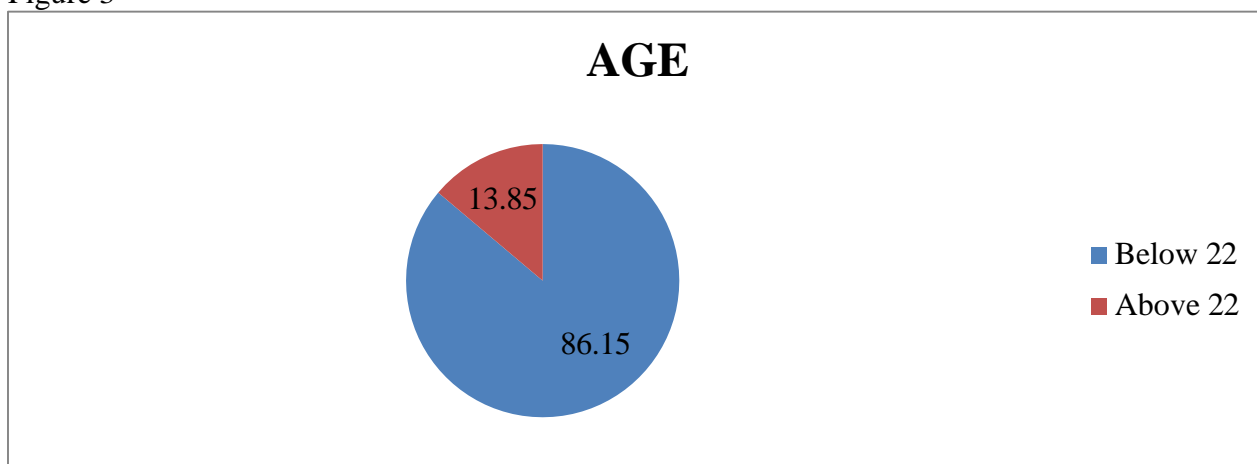


Figure 3 Pie chart showing Age of participants

79.22% were UG students and 18.18 % are PG students, 0.43% doctoral student and 2.16 from other category as shown in Figure 4

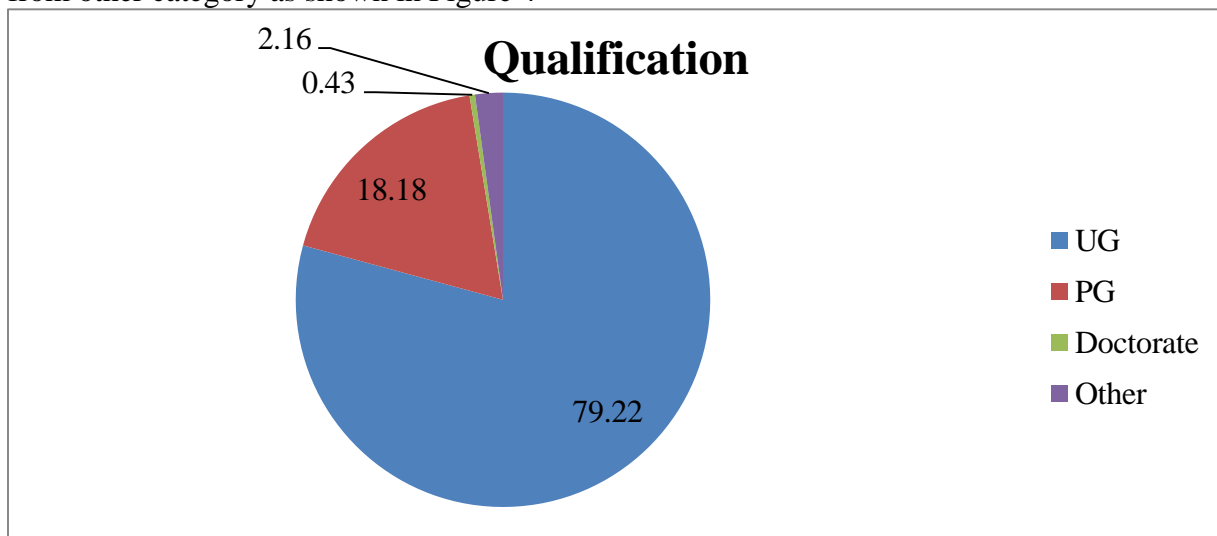


Figure 4 Pie chart showing distribution respondent's qualification

Among participants 52.38% students were from science programme, 19.91% from Engineering, 19.05 % from Commerce and Management programme and 8.66% from other programme as shown in Figure 5

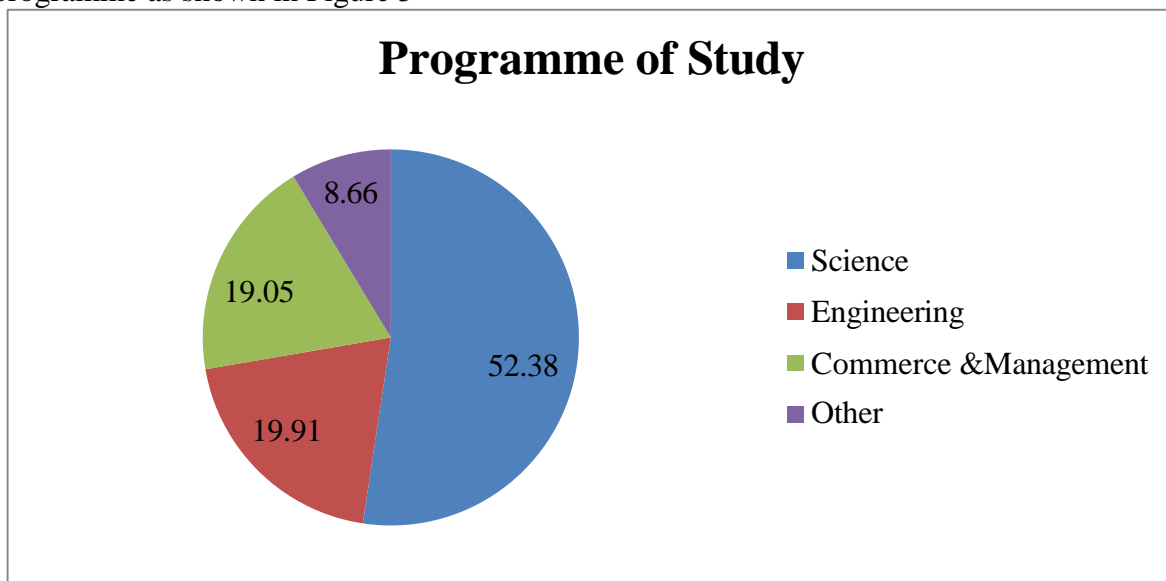


Figure 5 Pie chart showing distribution respondent's Program of Study

71.86 % participants were from Urban area and 28.14% were from rural area as shown in Figure 6 below.

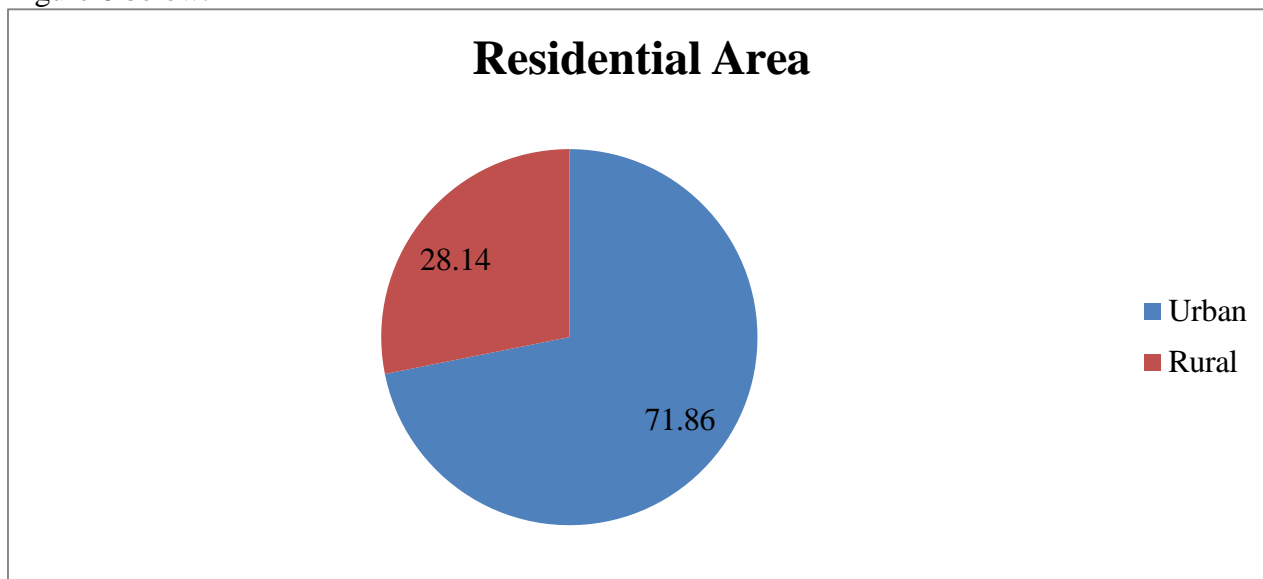


Figure 6 Pie chart showing distribution respondent's Residential Area

Among participants 37.20% students were from family whose gross income is < 40000, 28.60% were from gross income between 40000 to 70000, 14.30% were from gross income between 70000 to 1lakh and 19% were having gross income >1 lakh as shown in Figure 7 below.

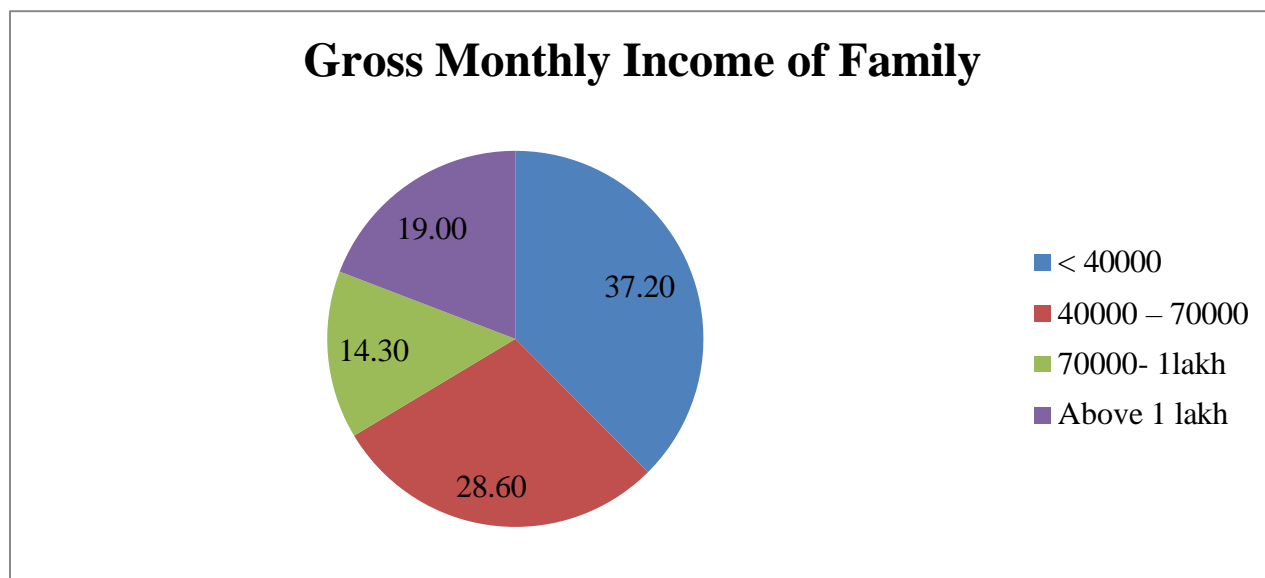


Figure 7 Pie chart showing distribution respondent's Gross Monthly Income of Family.

2. Technical requirements about Online classes:

Data collected using Google form also contains devices used, sources of internet,

online applications used and teaching methodology students liked during e-learning as shown in table below.

Attributes		Number	Percentage
Device used for online Classes	Smart Phone	181	78.4
	Laptop	109	47.2
	Desktop	18	7.8
	Tablet PC	2	0.9
Source of internet	Mobile Data Pack	172	74.5
	Wi-fi	91	39.4
	Broadband	12	5.2
Online applications used for online classes and communication	Zoom	182	77.8
	Google Meet	177	75.6
	Whatsapp	83	35.5
	Video calling	30	12.8
	Other	21	9.8
Teaching methodology students liked for e-learning	Online videos	162	69.2
	PPT	163	69.7
	Case study	85	36.3
	Brainstorming	51	21.8
	Role plays	19	8.1
	Other	12	6.2

Table 2 Technical requirements about online classes

Among learners 78.40% used smart phones, 47.20% used laptops, 7.80% used laptops and 0.90% used tablet as shown in Figure 8

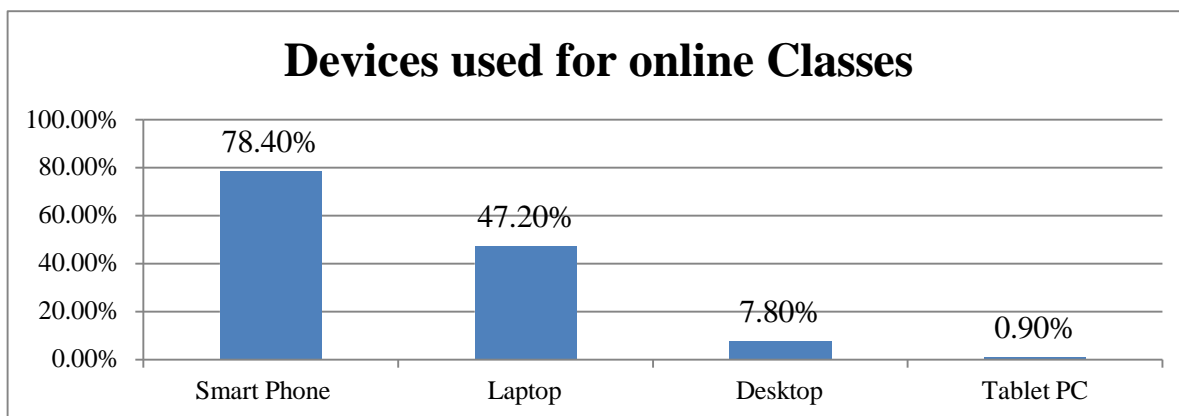


Figure 8 Column chart showing devices used for online classes.

Among students 75.50% used Mobile Data Pack, 39.40% used Wi-Fi and 5.2% used Broadband to access internet as shown in Figure 9

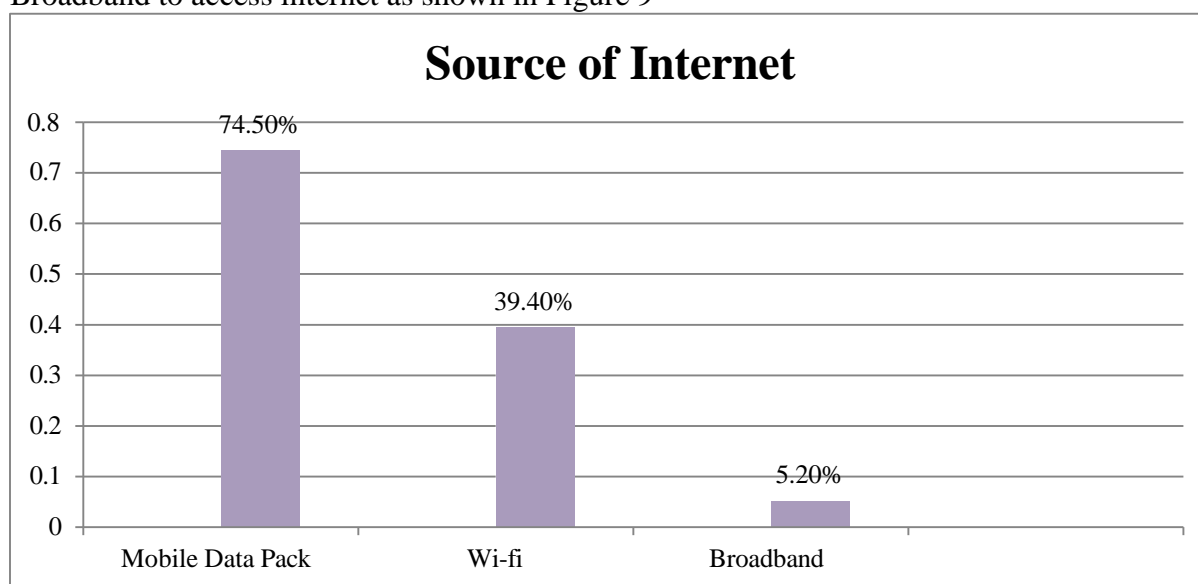


Figure 9 Column chart showing sources used for online classes.

Percentage of various Online applications used by learners for online classes and communication is 77.80% Zoom, 75.60% Google meet, 35.50% whatsapp, 12.80% video calling and 9.8 % other as shown in Figure 10

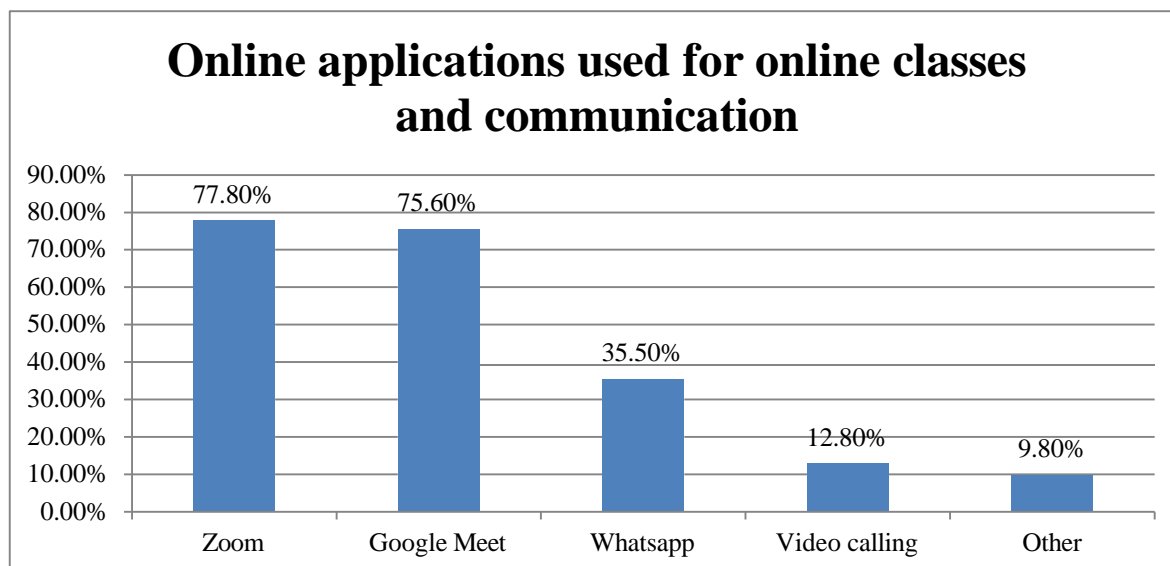


Figure 10 Column chart showing Percentage of various Online applications used by learners for online classes and communication

Percentage of teaching methodology liked by students for e-learning is Online videos 69.20%, PPT 69.70%, Case study 36.30%, brain storming 21.80%, role plays 8.10%, other 6.2% as shown in Figure 11 below

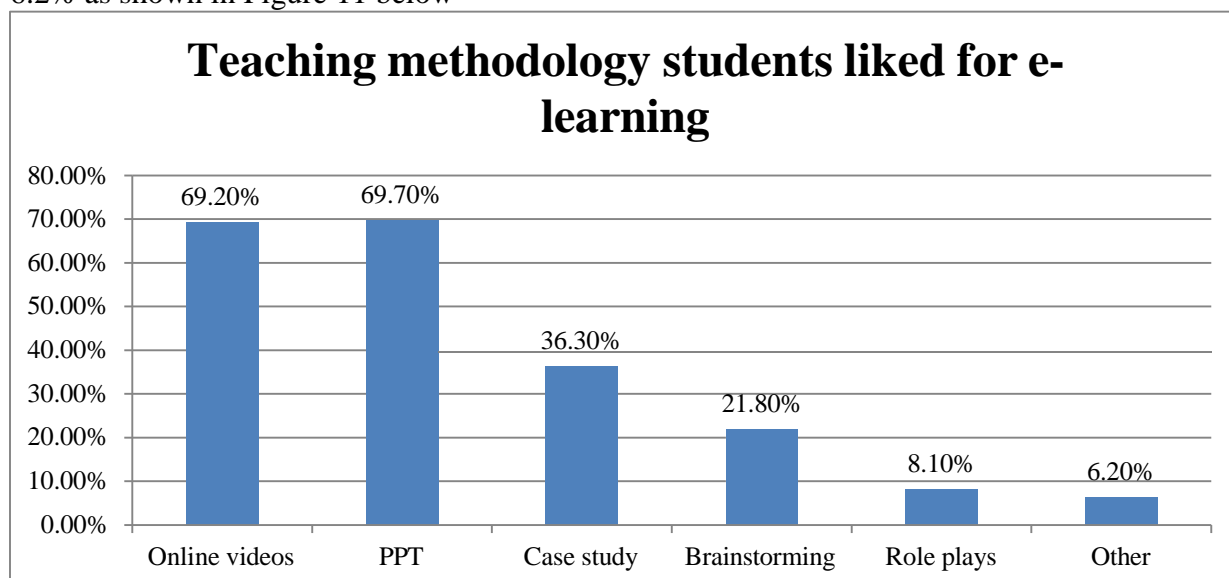


Figure 11 Column chart showing teaching methodology students liked for e-learning

Data collected using Google form also contains learners' preferences, perception, advantages, constraints and suggestions.

3. Perception and Challenges faced by students during Online learning

1) Online learning Benefits

Sr. No	Parameter	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1)	Flexible schedule and convenience	39	91	56	21	24
2)	More comfortable environment	33	81	64	31	22
3)	Improves your technical skill	32	79	71	25	24

4)	Self-discipline and responsibility	31	63	68	35	34
5)	Greater ability to concentrate	22	51	75	39	44

Table 3 Online learning Benefits

2) Problems in online learning

Sr. No.		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
6)	Lack of connectivity	42	77	61	31	20
7)	Data Limit	48	79	52	31	21
8)	Data speed	48	78	56	28	21
9)	Lack of Device	31	57	62	44	37
10)	No adequate home working space /environment	33	66	62	45	25
11)	Little/no face to face interaction	47	82	51	33	18
12)	Intense requirement for self-discipline	43	78	66	26	18
13)	Concepts were not very clear	62	64	51	34	20
14)	It is difficult to use digital technologies computer, video calls for learning	12	29	82	54	54

Table 4 Problems in Online learning

3) Offline learning Benefits

Sr. No.	Parameter	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1)	Face-to-face contact between teacher and student	75	65	55	18	18
2)	Teachers pay attention to each student	59	63	64	25	20
3)	Concepts were more clear	65	63	53	23	27
4)	Practical based learning	63	68	55	28	17
5)	Teacher-student interaction plays a crucial role in learning	76	71	47	16	21
6)	Hands-on laboratory experience is very important	80	71	48	11	21
7)	Enhances students' critical thinking skills	62	76	51	23	19
8)	Offline Examination's reliability is more than Online Examination	60	62	57	26	26
9)	Less distraction	35	65	73	31	27
10)	Interaction with other students	47	81	59	21	23
11)	Increases student competition leads to better learning	52	80	62	16	21
12)	Improves Punctuality	55	78	61	17	20
13)	Participation in Extracurricular activities increasing their social skills through making friends and teamwork	71	68	56	18	18

14)	Help in homework from fellow students	52	81	59	14	25
15)	Improves Humanity approach, Social and psychological well-being	60	77	59	18	17
16)	Offline Practical Exams are better to evaluate	63	76	54	17	21
17)	Offline orals / viva evaluates concepts	52	77	57	20	25
18)	Little to no technical issues of internet and devices	50	76	60	22	23
19)	Students are more serious and committed to their studies	62	65	61	21	22

Table 5 Offline learning Benefits

Hypothesis Testing

Hypothesis H_a: Students prefer offline learning System more than Online learning System.

Null Hypothesis H₀: Students prefer Offline learning System and online Admission System in ratio 50:50

Tables 3, 4, 5 shows data collected from students about Perception and Challenges faced and their opinions preferences about

Offline learning benefits, Problems and benefits in Online learning respectively.

Researchers combined Likert scale's response categories Agree and Strongly Agree responses into one category "Agree" and Disagree and Strongly Disagree into another category "Disagree" and they are used for hypothesis testing using chi-square test.

Sr.No	Students opinion for Offline learning Benefits	Agree	Disagree	Row Total
1	Face-to-face contact between teacher and student	140	36	176
2	Teachers pay attention to each student	122	45	167
3	Concepts were more clear	128	50	178
4	Practical based learning	131	45	176
5	Teacher-student interaction plays a crucial role in learning	147	37	184
6	Hands-on laboratory experience is very important	151	32	183
7	Enhances students' critical thinking skills	138	42	180
8	Offline Examination's reliability is more than Online Examination	122	52	174
9	Less distraction	100	58	158
10	Interaction with other students	128	44	172
11	Increases student competition leads to better learning	132	37	169
12	Improves Punctuality	133	37	170
13	Participation in Extracurricular activities increasing their social skills through making friends and teamwork	139	36	175
14	Help in homework from fellow students	133	39	172
15	Improves Humanity approach, Social and psychological well-being	137	35	172
16	Offline Practical Exams are better to evaluate	139	38	177

17	Offline orals / viva evaluates concepts	129	45	174
18	Little to no technical issues of internet and devices	126	45	171
19	Students are more serious and committed to their studies	127	43	170
Column Total		2502	796	3298

Sr.No.	O	E	O-E	(O-E)*(O-E)	(O-E)*(O-E) /E
1.	140.00	106.21	33.79	1141.78	10.75
2.	122.00	92.55	29.45	867.05	9.37
3.	128.00	97.11	30.89	954.43	9.83
4.	131.00	99.38	31.62	999.69	10.06
5.	147.00	111.52	35.48	1258.81	11.29
6.	151.00	114.55	36.45	1328.25	11.59
7.	138.00	104.69	33.31	1109.39	10.60
8.	122.00	92.55	29.45	867.05	9.37
9.	100.00	75.86	24.14	582.54	7.68
10.	128.00	97.11	30.89	954.43	9.83
11.	132.00	100.14	31.86	1015.02	10.14
12.	133.00	100.90	32.10	1030.45	10.21
13.	139.00	105.45	33.55	1125.52	10.67
14.	133.00	100.90	32.10	1030.45	10.21
15.	137.00	103.93	33.07	1093.37	10.52
16.	139.00	105.45	33.55	1125.52	10.67
17.	129.00	97.86	31.14	969.40	9.91
18.	126.00	95.59	30.41	924.84	9.68
19.	127.00	96.35	30.65	939.58	9.75
				Chisquare	192.12

$$\begin{aligned} \text{d.f. (degrees of freedom)} &= (r-1) * (c-1) \\ &= (19 - 1) * (2 - 1) \\ &= 18 \end{aligned}$$

From critical value table for 18 degree of freedom at 5% significance level = 9.390

Calculated value of chi-square is much higher than table value for Offline learning Benefits

Sr.No.	Students opinion for Online learning Problems	Agree	Disagree	Row Total
1)	Lack of connectivity	119	51	170
2)	Data Limit	127	52	179
3)	Data speed	126	49	175
4)	Lack of Device	88	81	169
5)	No adequate home working space /environment	99	70	169
6)	Little/no face to face interaction	129	51	180
7)	Intense requirement for self-discipline	121	44	165
8)	Concepts were not very clear	126	54	180

9)	It is difficult to use digital technologies computer, video calls for learning	12	29	41
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Sr.No.	O	E	O-E	(O-E)*(O-E)	(O-E)*(O-E)/E
1.	77.73	119.00	41.27	1703.35	21.91
2.	82.95	127.00	44.05	1940.07	23.39
3.	82.30	126.00	43.70	1909.64	23.20
4.	57.48	88.00	30.52	931.48	16.21
5.	64.66	99.00	34.34	1178.91	18.23
6.	84.26	129.00	44.74	2001.66	23.76
7.	79.03	121.00	41.97	1761.09	22.28
8.	82.30	126.00	43.70	1909.64	23.20
9.	7.84	12.00	4.16	17.32	2.21
				chisquare	174.39

d.f. (degrees of freedom) = (r-1) * (c-1) = (9 -1) * (2 -1) = 8

From critical value table for 8 degree of freedom at 5% significance level = 2.733

Calculated value of chi-square is much higher than table value for Online learning Problems

Sr.No.	Students opinion for Online learning Benefits	Agree	Disagree	Row Total
1)	Flexible schedule and convenience	130	45	175
2)	More comfortable environment	114	53	167
3)	Improves your technical skill	111	49	160
4)	Self-discipline and responsibility	94	69	163
5)	Greater ability to concentrate	73	83	156

Sr.No.	O	E	O-E	(O-E)*(O-E)	(O-E)*(O-E)/E
	84.91	130.00	45.09	2032.81	23.94
	74.46	114.00	39.54	1563.22	20.99
	72.50	111.00	38.50	1482.03	20.44
	61.40	94.00	32.60	1062.84	17.31
	47.68	73.00	25.32	641.00	13.44
				chisquare	96.13

d.f. (degrees of freedom) = (r-1) * (c-1) = (5 -1) * (2 -1) = 4

From critical value table for 4 degree of freedom at 5% significance level = 0.711

Calculated value of chi-square is much higher than the table value for Online learning Benefits.

From 19 questions of Offline learning benefits, 9 and 5 questions of Problems and benefits in Online learning respectively showed that chi-square is much higher than table value. So null

hypothesis H_0 is rejected and H_a is accepted.

Thus above hypothesis testing proves that "Students prefer offline learning System more than Online learning System."

Section II

3. RESULTS OF SURVEY:

The researchers interacted with many teachers, students, and parents then identified the challenges faced by students,

teachers in teaching learning pedagogy, challenges faced by parents and technical challenges during pandemic and post pandemic. Findings below assess the pre impact and post impact of covid-19 on education.

Teachers faced following challenges during online teaching

Knowledge of E-teaching: To cope with this sudden change of remote teaching, many teachers were not having prior knowledge of how to use online platforms for teaching how to develop instructional material for their subject. At start they used phone calls, video calls to get connected with students, then they train to use online tools like zoom meeting, Google meet or Microsoft teams and many more and conduct online lectures.

Staying Connected: In online classes staying connected with students is biggest challenge when teacher can't measure how students comprehend course content.

Synchronization, collaboration Missing: Interaction between teacher and student in online teaching-learning is asynchronous, might be because of network issue, or environment in which student is attending class.

Practical Sessions Conduction: Practical subjects like chemistry, physics, biology, IT, engineering requires practical session to demonstrate concepts, and to impart practical knowledge is also issue faced by teachers.

Lack of Engagement of Students in Online class: In online class is student's video is not ON from student side so teacher cannot observe their reactions so they can't predict how many students are really present, concentrating and learning also.

Students faced challenges as

Digital Literacy: Many of the students were not having knowledge of how to use digital devices as well as online platforms for the study.

Distractions and time management: As students were learning from home lot of distractions they face like home

environment, background noise etc. Similarly they may not follow strict time tables of classes due to ill health of parents, grandparents or family members, in such situations to remain motivated becomes challenge to students.

Lack of parental guidance: As both parents were working or might not be so literate to guide their children in e-learning

Physical and Mental Health: Students were suffering from Covid-19 themselves or family members so faced issues of Physical and Mental Health.

Social Economical and Psychological Repercussion: Students peers are also not there with them, psychologically also they find uncertainty about their future and facing economical and digital inequality issues. To support family economically many rural area students has to help their parents in farming so to attend classes according to time table is also challenge for students.

As students have to perform their practicals online, many online compilers are used to impart practical training.

Parents faced challenges as

Parents with low income can't afford to pay fees, make arrangements for digital devices and data packages for continuing online education of their ward.

Many parents lost their jobs or not able to run their business due to pandemic situation.

Parents who provided digital support also worried about whether time spent by their children online might make them vulnerable to harmful and violent contents.

Hardware and Network requirements challenges are common issue faced by all during pandemic.

For many there inadequate access to the broadband, computers, laptops and smartphones needed, there was misalignment between resources and needs.

In urban areas there were facilities for online learning but it impacted lot in rural areas as facing problems in network connectivity.

Students in rural areas cannot afford data packages needed to connect to online classes using video. So their presence is questionable by teachers.

During online exams, some students faced issues of network connectivities.

Opportunities in Online Teaching Learning

Teachers took lot of efforts to use technologies, learn new platforms, new tools to make teaching effective.

Teachers collaborate among others to improve teaching methods, engage and make virtual class more interactive.

Teachers also explored learnt creative solutions to assess and evaluate students.

Use of ICT by teachers helped them to advance their professional development.

For students it was an opportunity to become self-disciplined, self-learner, independent, adaptable, self-determined and responsible learner.

Education system realized that integration of technology in teaching will bring positive results.

Online Evaluation of Students:

As pandemic was going to sustain in education and as learning is continuous process, Universities in India decided to assess students online. They sent guidelines for affiliated colleges to conduct online classes and arranged webinars to train teachers. Colleges started conducting online classes and evaluation. Teachers use following methods to evaluate student. With lots of trial and error it is decided by

Online Assignments: As classes are conducted online during pandemic by colleges, Evaluation also carried out online. Through Google class rooms students have been given assignments which they have to upload, MCQ quizzes are used.

Online Platforms for Practical's: As teachers used online compilers to demonstrate practicals.

Scenario of Evaluation by SPPU, Pune

As lockdown for colleges and schools was announced on 16th March 2020, at that

time some of practical exams of UG classes and backlog exams were going on. Due to lock down university decided to conduct online exams for last year students and first year and second year students based on their previous marks and internal marks promoted to second year and third year respectively.

Procedure for Online Exam

University built their application for students named student profile system from where filling online exam form has to be filled by students online.

After filling Exam Form Student was supposed to inform filled Exam Form Number/Application Number to respective college.

College will then inward given Exam Form Number/Application Number.

Once form has been Inwarded, then only Student can pay his/her exam form fees online by using student login. University supported all online activities by online calling during office timings.

Time table was displayed on website and students first time appeared for online exam only last year students and students having previous backlog in October and November 2020 for students of academic year 2019-20.

But after online exams when results are declared surprisingly students whoever was having backlog for many subjects also passed. So cheating is adopted by students in online exam though it should not be there.

For academic year 20-21, and academic year 21-22 odd semesters, same process of exam form filling using student profile system took place for all first, second and third year students, but to avoid cheating by students in online exam, online 'proctored test' method is adopted by SPPU which IITs uses to carry out their online examinations. In "proctored test" students can use smart phones, tablet, laptop or desktop computers and appears for exam from anywhere. Students' movements are monitored, if system finds that student tries to do some cheating,

three warnings are given to him or her, instead of warnings if student's movements are continued then he got disqualified from exam. Due to online teaching- learning process teachers, colleges and universities took due efforts to teach students and conduct exams.

4. CONCLUDED FINDINGS AND SUGGESTIONS FROM SURVEY

Survey findings shows that students prefer offline learning system. As future we cannot predict that world may not face pandemic again as now a days again there are lot of news from China of pandemic and new variants. There are benefits of online learning also, crisis necessitates use of technology in education. It made educators and policy makers to reform education structure. As in pandemic teaching continued in virtual manner, if any student misses out lecture due to personal or health problem or for exam preparation, he could use recorded lectures to study and get concept clear. Students became more independent, they used different online tools to understand topic better. Teachers took lot of efforts in learning new tools and used aids in teaching their subject in more creative way so that they can keep students engaged. Even for evaluation multiple choice questions, match the following, puzzles, quizzes are good options. So for post Covid-19 education, there should be use of hybrid teaching approach where combination of physical and virtual environments will be there. Hybrid approach will focus on learning environments which will help to use huge amount of data available on internet to develop skills of student which enables them to think logically, use data for research and innovative purpose. Covid-19 acknowledged that there are variations in students as there was disparity in home learning environments, internet device accesses, so future education should help

students to learn at their own pace. Lot of difficulties is faced by post graduate students who have completed their undergraduate education in virtual mode. To fulfill student centric learning, teacher's role is to provide resources provider, as per student's needs. To provide this personalized teaching to know strength and weaknesses of learners, teacher should be enabled with technology to tailor their course plan preparation, actual teaching learning and evaluation for their students. Curriculum development should also take care of these teaching learning changes required.

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