Factors Influencing Use Of Technology By Higher Education Teachers And Impact Of Covid-19

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ABSTRACT

The use of Information and Communication Technology (ICT) has acquired immense prominence in the field of education over the last two decades. Many past researches have revealed that students accept technology easily, but implementation of the same by the teachers has been inconsistent with the requirements. This paper aims to analyse the critical factors which influence the use of technology in higher education by teachers inside and outside the classroom, with focus on differing attitudes of teachers towards use of technology for education. Moreover, at the time of the paper being written, most of the countries in the world were going through Covid-19 lockdown which has made us realise that use of technology is not optional anymore - it is THE only means to impart education in such situations where physical classrooms are not a possibility. For the purpose of this paper, data from primary as well as secondary sources was generated and analysed. The results indicate an overall positive attitude of the teachers in using ICT, but a lot more needs to be done to overcome the challenges.

Keywords: Covid-19, critical factors, higher education, ICT, use of technology.

Introduction

Technology has taken over the world in a big way. The education sector hasn't been left untouched by technology either. Educational technology is a powerful tool which can make the teaching learning process interesting and meaningful. The integration of technological tools can create a dynamic learning environment where students are active participants in the learning process which results in improved academic achievement, improved attendance, and improved behavior. Also, students in technology-infused classrooms are able to perform better in varied environments and carry out complex reasoning tasks. Many teachers have led the way in integrating technology with their teaching, but scores of them have been apprehensive of the change. This difference in attitude & perceptions between the teachers is because of numerous factors which influence them, knowingly or unknowingly.

Over the past few years, the Indian government has also taken several ICT initiatives for Higher Education like the National Mission on Education through Information and Communication Technology (NMEICT), e-learning resources such as Swayam 2.0, Swayamprabha, Shodhganga, etc. for the benefit of all the learners in Higher Education Institutions in any time any where mode. Moreover, the UGC guidelines explicitly entitle the students to the use of ICT resources in its Student Entitlement Guidelines. To meet these guidelines, it becomes imperative for the teachers to incorporate technology into instruction. Covid-19 has caught the education sector off-guard, wherein several higher education teachers are struggling to get a foothold in this new world.

Review of Related Literature

The benefits that the students receive by use of ICT for teaching and learning have been stated time and again through various researches. Sharma, Rajesh & Mukherjee, Tanushri. (2018) conducted a survey of 100 college going students who were exposed to the application of ICT tools in their day -to- day life. It was established

from the survey that students prefer a two way and multimedia based teaching method which helps them to express themselves better and understand the concepts. Vladimir Kryukov, (2016) states that ICT reduces the students' dependency on teachers, thereby stimulating the development of their individual abilities, independence, initiative, and responsibility. Ozdmemir and Abrevaya (2007) asserts that apart from improved course quality, adoption of ICT also reduces the costs per student and therefore helps in increasing the number of enrolments in the institutions by making it more affordable for the students.

Many research studies show that even though most teachers value its relevance, they do not make use of the potential of ICT to improve the quality of learning environments (Loague, Caldwell and Balam, 2017; Jagadesh, 2017;Nakaznyi, 2015). Zhao and Cziko (2001) have stated three conditions as necessary for teachers to use ICT in their teaching: teachers should believe that the use of technology would be more effective than alternative methods, teachers should believe that it will not cause any disturbances to other goals to be maintained, and finally that they have adequate ability and resources to use technology.

Many theories have been formulated to anticipate human behavior which can be used to understand teacher's perceptions about using use of technology. Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975) states that a person's intention toward performing a behavior (such as using computer technology) is a function of their attitude about the consequences of the behavior and subjective norms like the influence of external factors (colleagues, friends…etc.). In 1991 , another variable 'perceived behavioral control' Ajzen, Icek. (1991) was added which accounts for considerable variance in actual behavior.The Technology Acceptance Model (TAM) (Davis, 1989) which can be regarded as an extension of TRA states that ease of use of technology and its usefulness determine present usage as well as future usage, with greater correlation to usefulness.

Studies conducted by Nancy Pope Wingo, Nataliya V. Ivankova, Jacqueline A. Moss(2017) disclosed that faculties have perceived barriers to success of online methods of teaching. Shazia Mumtaz (2000) has found that availability of up-to-date technology may not provide enough stimulus to the teachers for adopting ICT in their teaching methods; it is the teachers' belief in the effectiveness of the use of ICT which plays a crucial role. Research by Goyal, Purohit & Bhagat (2010) concluded that , generally, the way ICT is presently being used in their institute is not satisfactory enough for the stakeholders - stakeholders would be satisfied only when they get what they expect from technology.

Teachers and Technology

Interaction and engagement with the students are two of the most important factors in education. The chalk and talk method needs to be supplemented by innovative educational experiences to create an environment which is rich in visualisation, increases the possibility of interaction and enhances communication amongst the study group.

As and when new technologies have developed, communication mediums have evolved prompting the change in the interaction methods between the student and teacher too. It has been seen that while a few teachers show keen interest in using technology for teaching, some teachers still prefer the traditional way. Here, technology refers to the mechanisms which are used for communication using various electronic mediums such as computers(hardware and software), videos, mobile based educational apps, virtual clasrooms, e-learning platforms such as Swayam, Coursera, E Learning College, etc. Most of these technologies can be used for outside-the-classroom teaching as well, which has become the need of the hour.

Nowadays, most teachers have started employing technology with easy access through smartphones, but the extent of technology used by teachers varies drastically. Some teachers show proactiveness in using technology, while others are reluctant to do so. As a result of the literature review, the factors which contribute to the varied extent of use are :

Factors responsible for use of ICT

- Improves students' learning
- Personalised experience
- Real time flow of information
- External factors such as national guidelines, opinions of colleagues, pressure from parents and pupils, the institutions policies on using ICT and training, etc.
- Personal past experience with technology
- Retention of students' interest
- Self - satisfaction
- Convenience
- Better career prospects

Factors responsible for Reluctance towards use of ICT

- Preparation is Time - consuming
- More Teaching Experience through traditional methods
- Dissatisfaction with the outcome
- Lack of Technical Support from the institution
- Disregard for technology
- Low confidence in using technology
- Belief in traditional methods
- Lack of technical know-how
- Lack of motivation
- Difficult to control class

Impact of Covid-19 on education and tech

The centuries-old traditional way of teaching has had to be suddenly replaced by new methods because of the Covid-19 lockdown imposed in most countries. The drastic change in the landscape has also initiated the Indian government to take appropriate measures towards liberalising the open, distance and online education regulatory framework. During the lockdown, MHRD launched a comprehensive initiative called 'PM eVIDYA' for multi-mode access to digital education wherein 100 top universities were permitted to start online courses immediately.

Various academics have observed the effects and impact of the pandemic on the higher education sector. Dr. Kumar(2020) observes that the sudden lockdown due to the pandemic has steered the education sector forward with technological innovation and advancements. Instead of giving in to the circumstances, institutions have adopted online education to nourish its students. Universities are encouraging the faculties and students to observe the current scenario and understand the urgency to automate. An article by John& Hasnain(2020) suggests that to cope up with the disruption in the higher education sector, the University Grants Commission (UGC) and other regulatory bodies would need to revise their faculty selection protocols to check for tech-friendliness.

'Team should carve out new education model' (2020) observes that very few institutions have had an easy transition from traditional to online delivery model with teachers trying to replicate classroom-style teaching through video conferencing platforms available in the public domain such as Zoom, Skype, etc. A majority of the institutions, even if they had the infrastructure to support technologically driven education, were not making optimum use of those resources for digitisation of education process and as a result, are facing problems to fast-track the process of transition. Also, for students who have gone back to their hometowns, connectivity might be a major hindrance in accessing online content.

Considering that India has 3.5 crore students enrolled for higher education in a total of 53,620 institutions across the country, an effective online education model needs to be developed to overcome the challenges our education system is facing due to the pandemic.

Objective of the Research paper

The study was conducted with the following objectives :

- to understand the factors which affect teachers' use of ICT for teaching in higher educational institutions
- to analyse teachers' attitude towards use of ICT for regular academic delivery
- to develop and understanding about how teaching has been affected because of sudden lockdown due to Covid-19

Research Methodology

Considering that ICT has emerged as a powerful tool in teaching and learning, it becomes necessary to study the perceptions of the teachers in employing these tools.

As part of Research Methodology, Primary Data collection methods such as interviews with higher education teachers and individual survey were used.

For the survey, a questionnaire for online survey was designed using 'Google forms'. The questionnaire was sent through emails and mobile apps to collect responses from teachers who are teaching in Higher Educational institutions situated in Mumbai. The questionnaire comprised of a mix of demographic and likert scale questions to analyse the factors which affect their use of ICT, the attitude of teachers towards use of ICT and impact of Covid-19 on teaching and learning process. The first 101 responses were then analysed using Quantitative Research method through 'Google spreadsheets'.

Individual interviews with 5 higher education teachers in Mumbai were conducted over the phone to understand their perceptions about using ICT and their usage patterns.

Apart from the Primary Data collection method, the study also includes a detailed Secondary Data analysis of related literature from various publications, newspaper articles and websites.

Data Interpretation and Analysis:

1. Survey Questionnaire

Part I - Demographic information

Gender Of The Respondents :

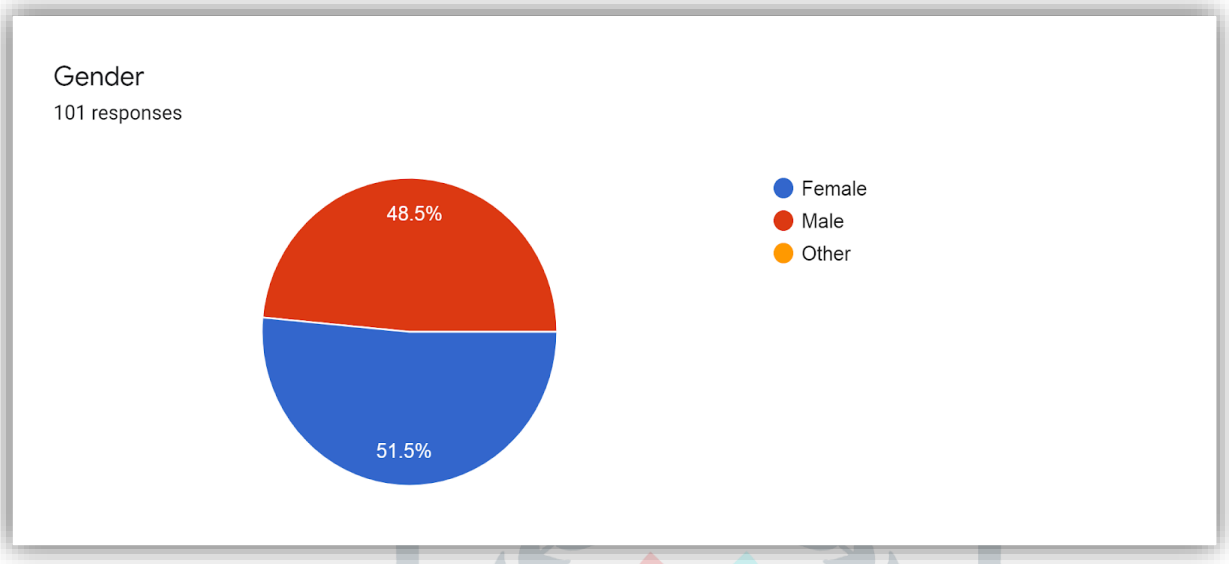


FIGURE 1

To develop an idea about the gender of the respondents is the first most important aspect of interpreting the opinions by both the genders, although gender was not a preset criteria for selection of the respondents. The respondents comprised of 52 females and 49 males. . (figure 1)

Age Of The Respondents:

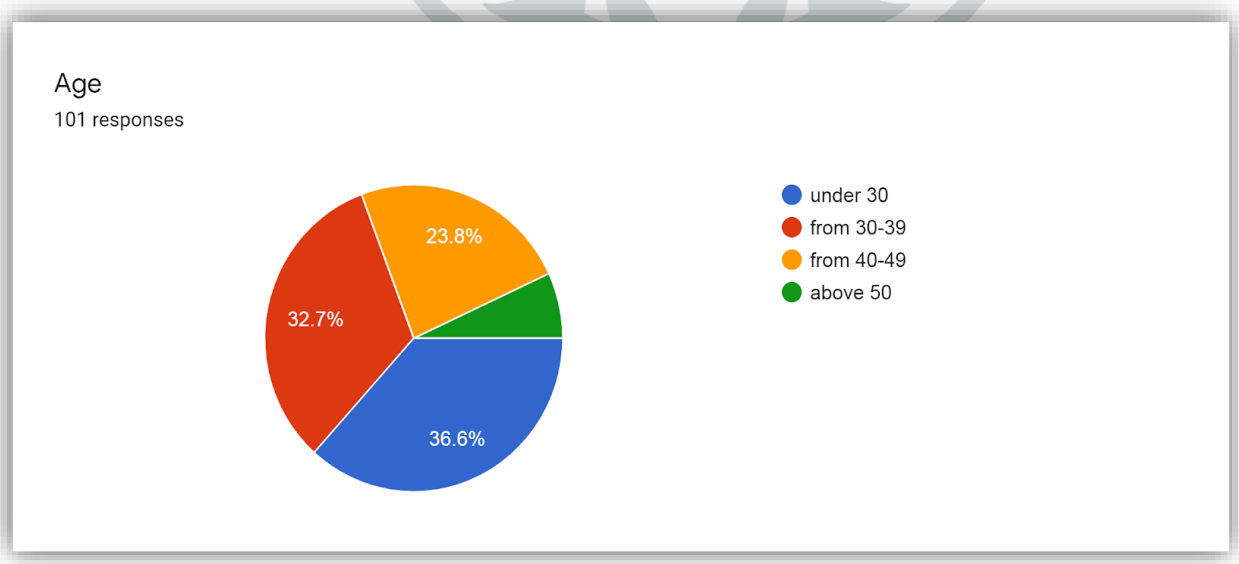


FIGURE 2

The age of the respondents plays a significant role in understanding their opinions about the topic. The results show that 37 teachers who responded were under the age of 30 years, 33 were between the ages of 30 and 39 years, 24 were between the ages of 40 and 49 and only 7 teachers were above the age of 50 years. . (figure 2)

Years Of Teaching Experience:

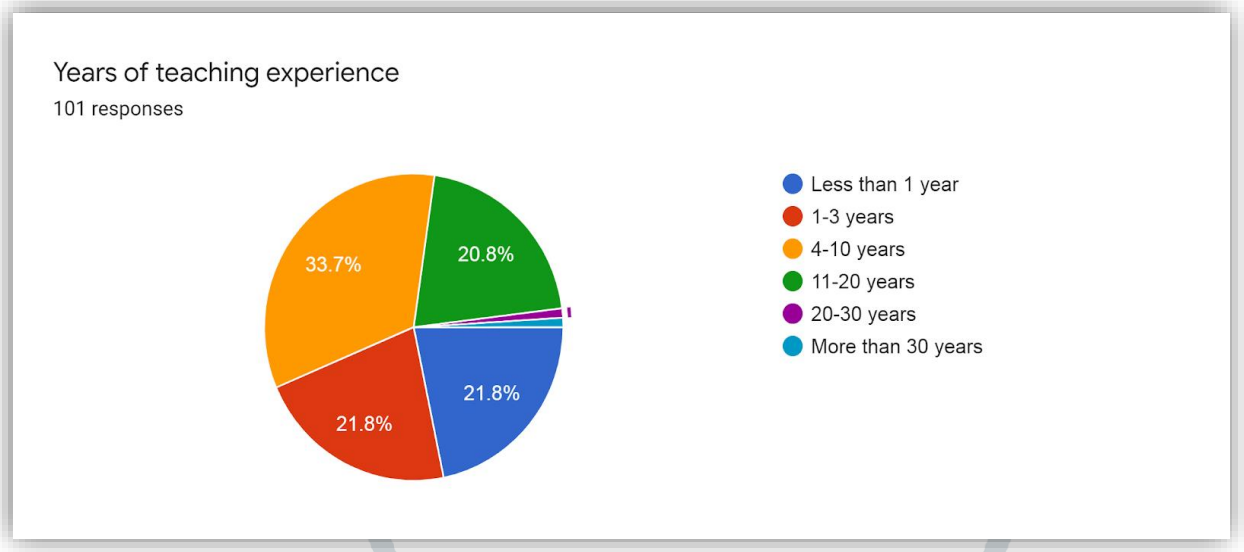


FIGURE 3

The number of years of teaching experience, which has been identified as a factor through literature review, can also be instrumental in interpreting the responses of the questionnaire. A majority of the respondents (56 of them) had less than 3 years of teaching experience, 22 of them had experience of 4-10 years, 21 teachers had experience of 11-20 years, while only 2 teachers had experience of more than 20 years. . (figure 3)

Part II - Importance and Usage of ICT

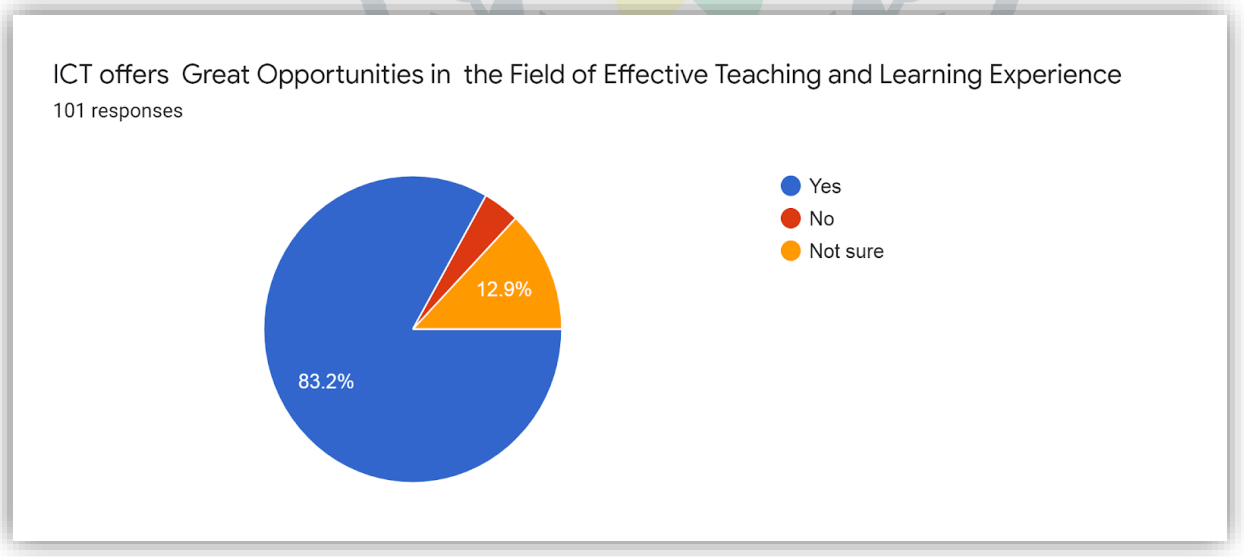


FIGURE 4

Teachers will use ICT competently only if they believe that it offers great opportunities in the field of effective teaching and learning experience. The results of this question in figure 4 shows that most teachers do believe so - 84 of the respondents are of the same opinion, 13 are not sure of it, while very few - only 4- do not feel that ICT is helpful. . (figure 4)

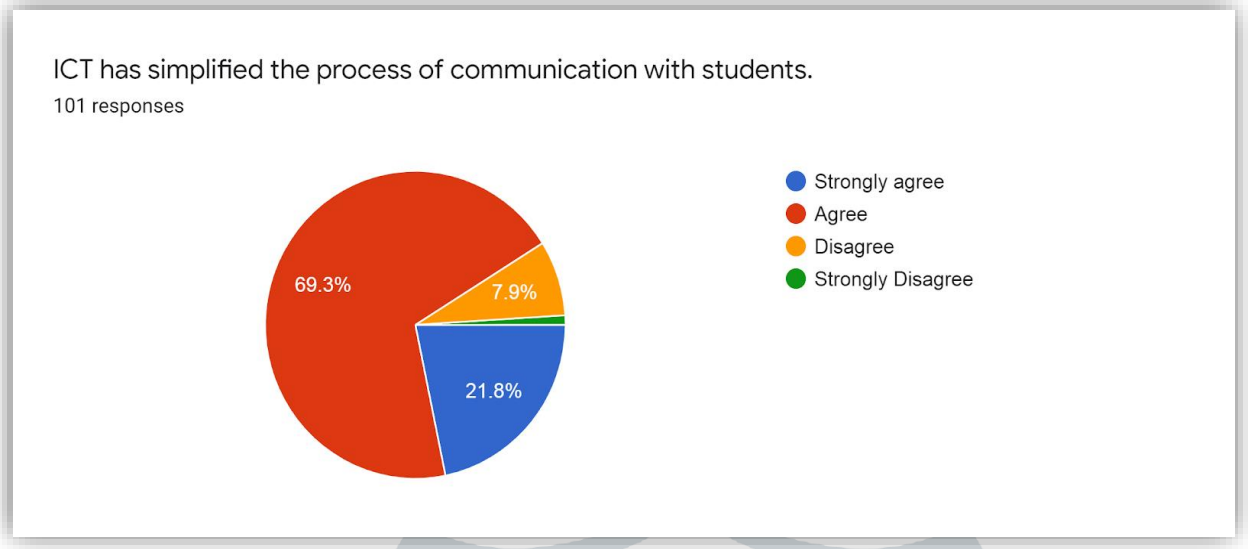


FIGURE 5

Modern tools of communication are increasingly being used by teachers to interact with the students. 91.1% of the respondents either strongly agree or agree that ICT has indeed simplified the process of communication. (figure 5)

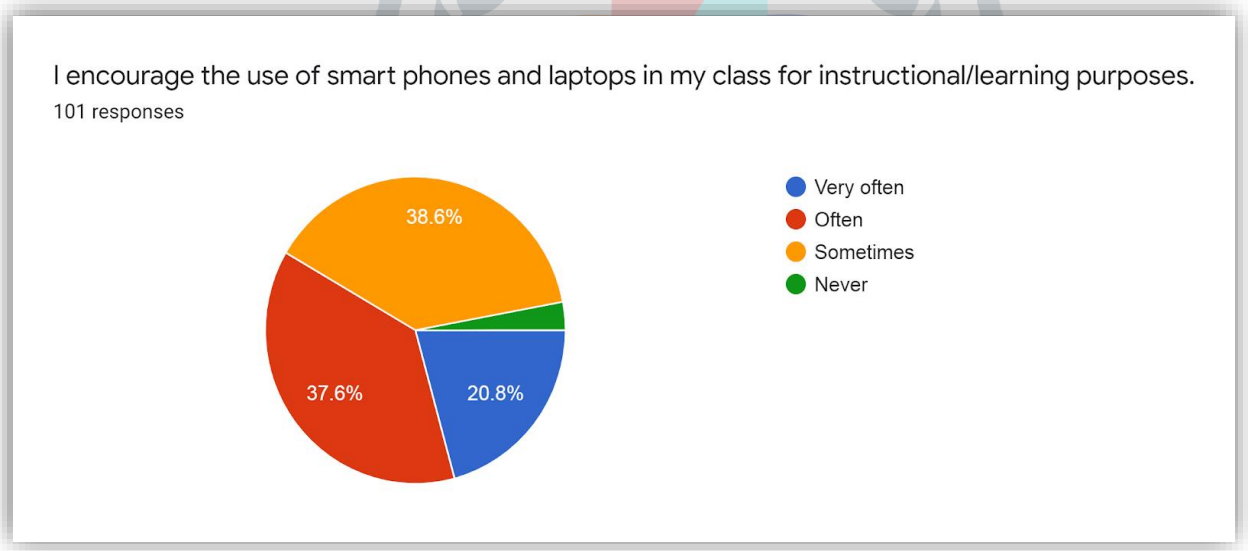


FIGURE 6

The above question was very important as smart-phones and laptops are the most common devices used to share study material with the students. With the exception of 3 respondents, who have never encouraged the use of these devices, all the other respondents encourage the use of smart phones and laptops in their class for instructional purposes with varying frequency. (figure 6)

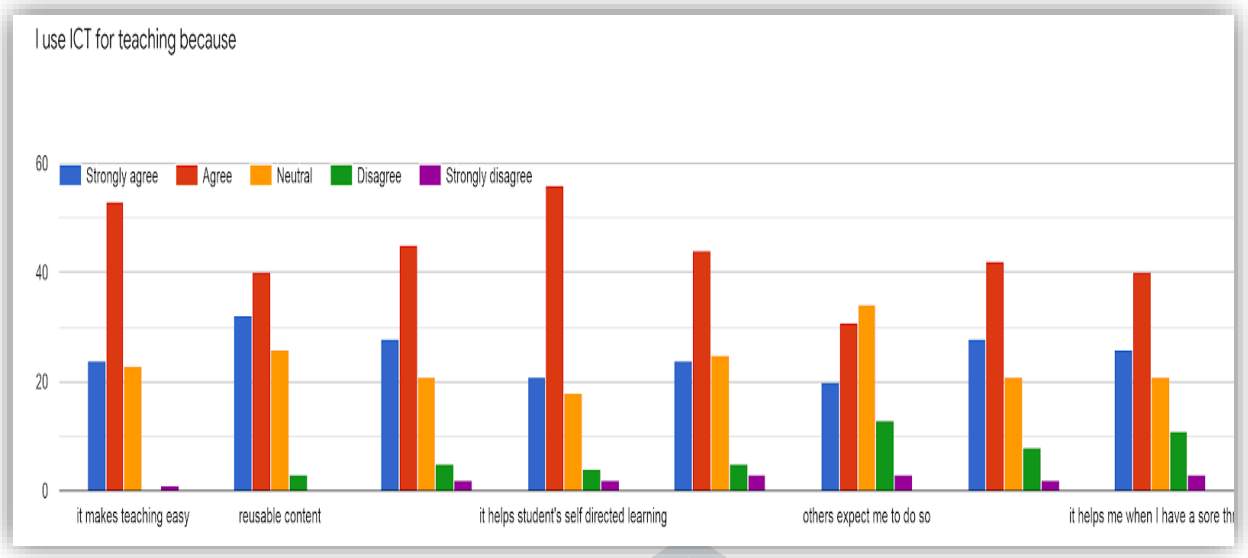


FIGURE 7

This question on reasons why teachers like to use ICT had 8 parts with multiple options on the likert scale. The first 2 parts dealt with personal reasons, the next 3 were about how they think it affects students, the 6th part was about others' expectations from them to use ICT and the last 2 were to enquire if using ICT was physically beneficial for them.

I use ICT for teaching because -	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)
it makes teaching easy	23.8	52.5	22.8	0	1.0
reusable content	31.7	39.6	25.7	3.0	0
it evokes students' curiosity and excitement	27.7	44.6	20.8	5.0	2.0
it helps students' self directed learning	20.8	55.4	17.8	4.0	2.0
effective in retaining students' attention	23.8	43.6	24.8	5.0	3.0
others expect me to do so	19.8	30.7	33.7	12.9	3.0
it saves my work of writing on board	27.7	41.6	20.8	7.9	2.0
it helps me when I have a sore throat	25.7	39.6	20.8	10.9	3.0

The responses of the first 2 parts clearly indicate that most teachers either strongly agree or agree that ICT makes teaching easy and provides reusable content. The same can be said for the next 3 parts of the question also where most respondents strongly agree or agree that it evokes students' curiosity and excitement, it helps student's self directed learning and it is effective in retaining students' attention.

For the 6th part of the question, interestingly 51 respondents(50.5%) either strongly agree or agree to use ICT because others expect them to do so; 34 respondents are neutral; and 16 respondents either disagree or strongly disagree to it. This result explicitly denotes that external factors such as other's expectations play a very important role in teachers' use of ICT.

The 7th and 8th part of the question highlights that most teachers also use ICT to save their physical energy. 69 respondents (68.3%) either strongly agree or agree to use ICT because it saves their work of writing on board,

whereas 65 respondents (64.3%) either strongly agree or agree to use ICT because it helps them when they have a sore throat. . (figure 7)

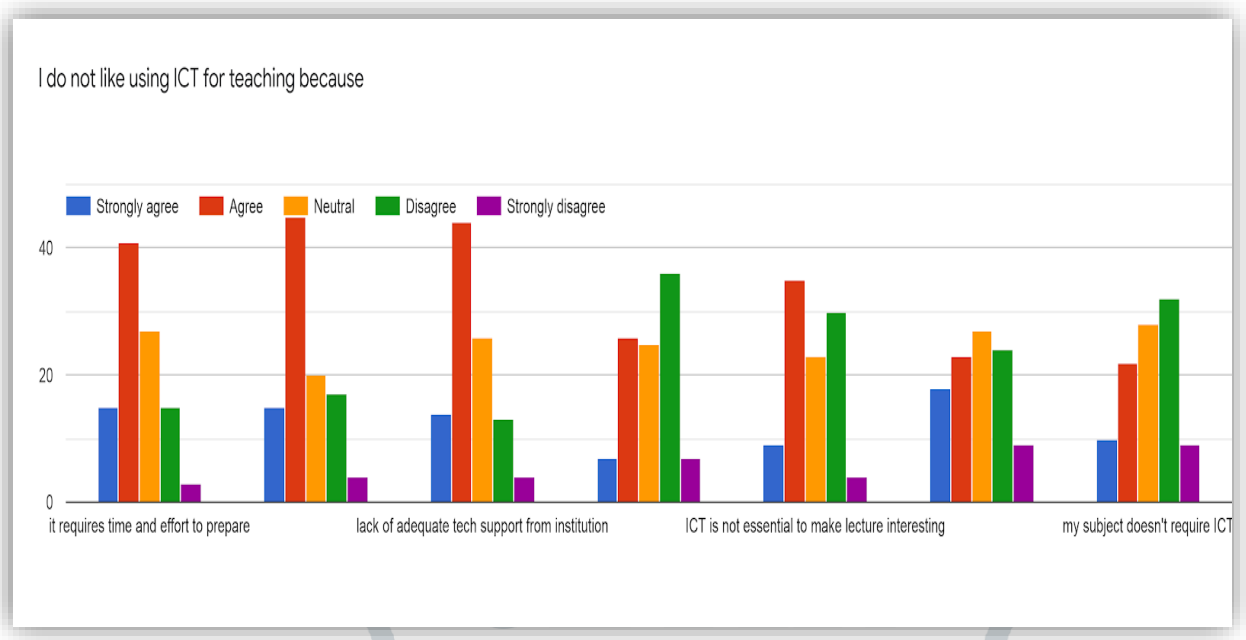


FIGURE 8

As part of the study, it was necessary to find out why teachers are reluctant to use ICT despite knowing its immense relevance in today's times. This question tries to ponder upon the reasons why teachers do not like to use ICT for teaching through 7 parts with multiple options on the likert scale. The responses were as follows:

I do not like to use ICT for teaching because -	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)
it requires time and effort to prepare	14.9	40.6	26.7	14.7	3.0
I like chalk and talk method better	14.9	44.6	19.8	16.8	4.0
lack of adequate tech support from institution	13.9	43.6	25.7	12.9	4.0
I am not confident in using technology	6.9	25.7	24.8	35.6	6.9
ICT is not essential to make lecture interesting]	8.9	34.7	22.8	29.7	4.0
it makes it difficult to control class	17.8	22.8	26.7	23.8	8.9
my subject doesn't require ICT	9.9	21.8	27.7	31.7	8.9

The above results noticeably depict that the reasons why teachers do not like the use of ICT are mostly based on their perceptions. Another major reason was lack of adequate technical support from the institution which was strongly agreed or agreed by 58 respondents while 17 were neutral in their response. This demonstrates that more technical support needs to be provided to the teachers so that their perceptions about using ICT might see a positive change and they can confidently integrate ICT with their teaching. (figure8)

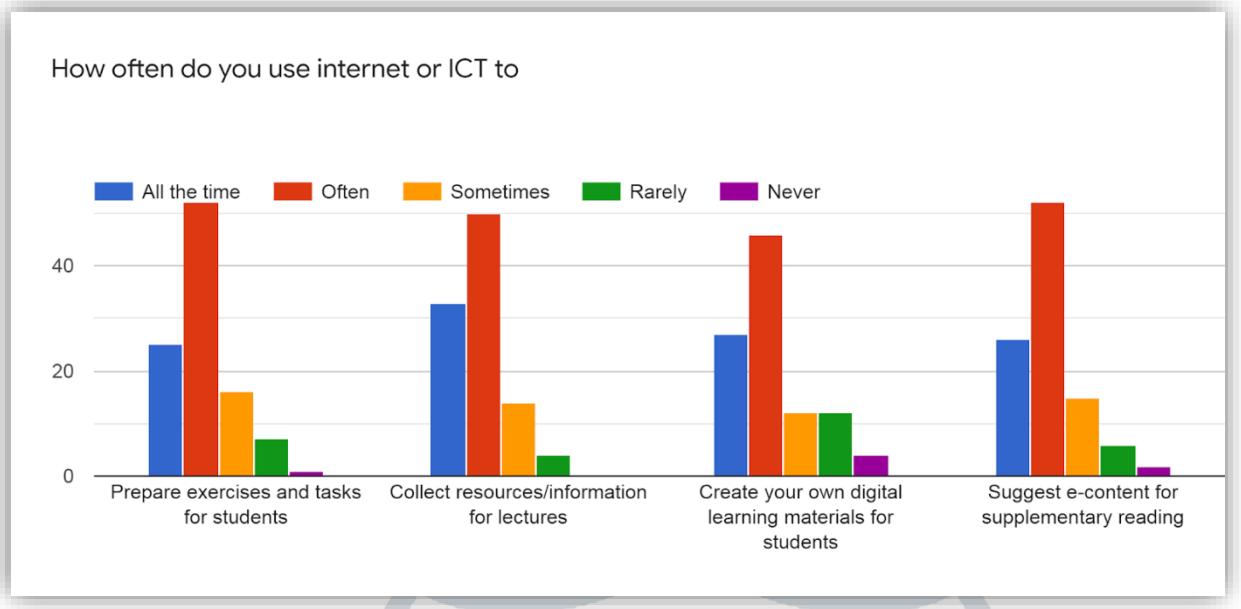


FIGURE 9

The findings of this question are very clearly indicative that 70-80% of the sample strength uses internet or ICT for one or the other purpose all the time or quite often; 12-16% use it sometimes at least; a very nominal number of respondents have never used internet or ICT for any of the mentioned purposes. (figure 9)

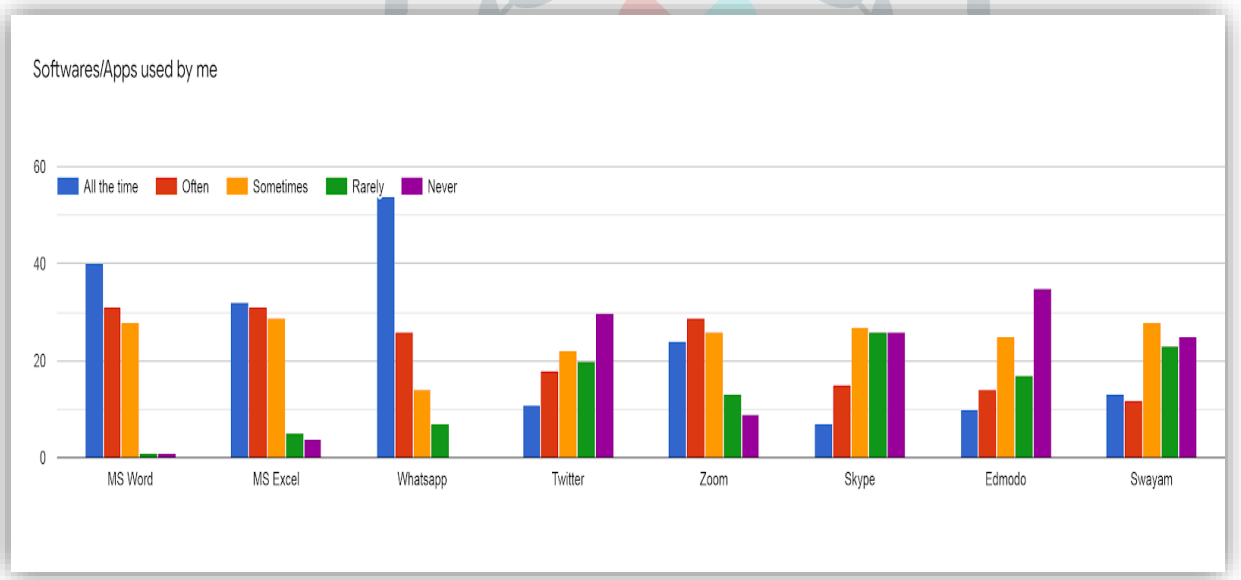


FIGURE 10

The above question was included in the questionnaire to get an idea about teachers' attitudes towards various softwares and apps which are easily available and executable from smartphones too. A range of options was given to rate on the likert scale to understand the difference between the usage of ICT for personal and professional use.

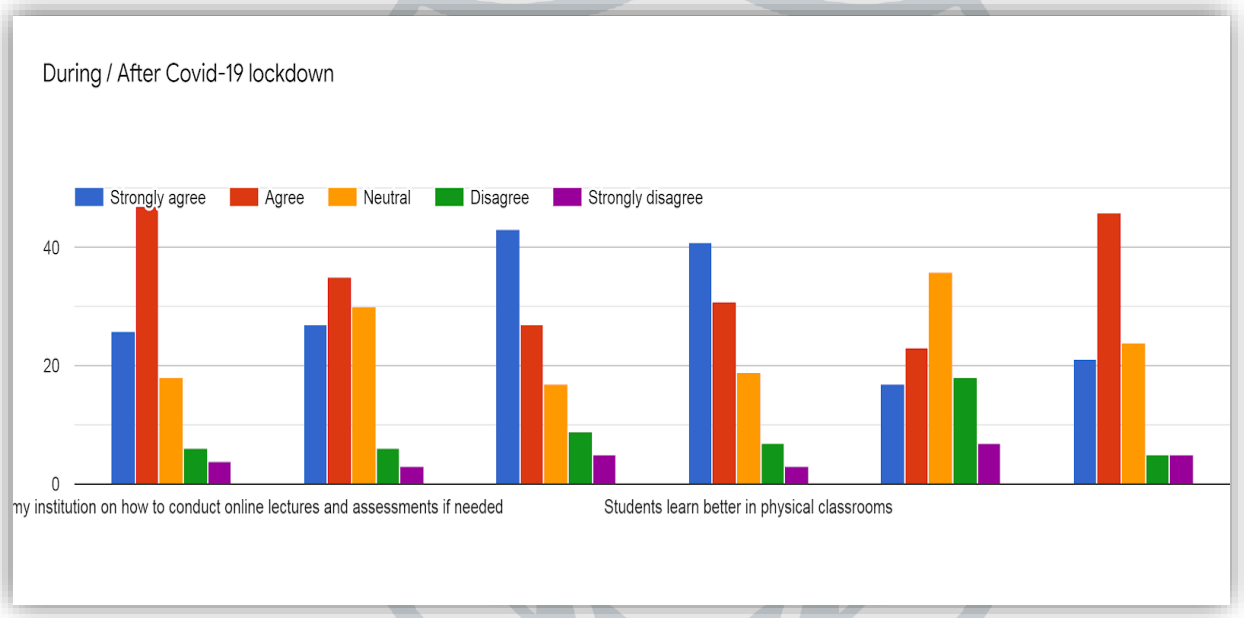
MS Word and MS Excel, which are used most often for profession purposes, is used by most of the respondents at least sometimes.

The results to the 3rd part quite noticeably denote that Whatsapp, which is the most commonly used online communication app of the time, is used all the time by more than half of the sample strength, i.e. 53.5% of the

respondents. Twitter, Zoom and Skype, which are social networking apps which are used relatively less frequently than Whatsapp, with quite a few who have never used them at all.

The responses to the usage of Edmodo and Swayam, which are educational apps, are self explanatory. A high percentage of teachers (34.7% & 24.8% respectively) have never used these apps - apps which can be used to supplement the curriculum based teaching.

The findings from the responses to this question shows teachers use technology for meeting personal requirements much more than for professional requirements. This vast difference reinstates the objective of the study that teachers' attitudes play a major role in their use of ICT. This further indicates that teachers are either not aware of the ways in which technology can be integrated with teaching, or they are reluctant to do so because of various reasons. (figure10)



Part III: Impact of Covid-19

FIGURE 11

As part of the study, it was necessary to find out how teaching has been impacted by the sudden lockdown due to Covid-19 and what are the teachers' perceptions about prolonged online teaching methods. This question comprised of 6 parts with multiple options on the likert scale.

During / After Covid-19 lockdown	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)
I was provided training by my institution on how to conduct online lectures and assessments if needed	25.7	46.5	17.8	5.9	4.0
I think my institution's infrastructure is well-equipped to conduct online teaching and assessment activities	26.7	34.7	29.7	5.9	3.0

I find teaching in physical classroom more effective than teaching online	42.6	26.7	16.8	8.9	5.0
Students learn better in physical classrooms	40.6	30.7	18.8	6.9	3.0
I like taking online lectures more	16.8	22.7	35.6	17.8	6.9
I will require more digital skills to face similar situations in the coming days/future]	20.8	45.5	23.8	5.0	5.0

The responses to the first 2 parts clearly suggest that most teachers thought favourably about their institutions in terms of the capability to train the teachers as well as develop the necessary infrastructure to conduct virtual education delivery.

The questions in the 3rd and 4th part were to gather teachers' opinions about online classrooms as compared to physical classrooms. As expected, a majority of the respondents find physical classrooms more effective and feel that even students benefitted more from face-to-face teaching method.

The 5th part of the question which dealt with teachers' liking of online teaching in a very straightforward manner, received a mixed response from the sample. 39.5% of the respondents liked it, 35.6 % are neutral about it and 24.7% either disagree or strongly disagree to it.

The aim of the last part of the question was to determine how confident teachers were with their present digital skills and if they felt the need for more training in this regard. The response to the questions clearly highlighted that most teachers (66.3%) either strongly agree or agree to requiring more digital skills than they currently possess, 23.8% are neutral about it and only a few teachers(10%) are quite confident of their digital skills. (figure11)

2. Individual Interviews:

All 5 teachers were individually asked questions about their perceptions on usage of ICT and the factors which affect their use of ICT for teaching. All these teachers liked using ICT, though there were some challenges too.

The factors which were revealed by these interviews were as follows :

Factors which encourage them

- Students' understanding is increased
- Students' attention span is increased
- Provides a variety of tools to engage the students
- Helps teachers to focus on content-oriented teaching as they can gather information from various sources which the course content might not cover
- Helpful when teacher not feeling well, physically or mentally
- Enhances teachers' own performance and skills.

Factors which discourage them

- Makes the teacher dependent on outside factors like connectivity, availability of proper equipments (laptop, speaker, projector, cables, robust internet connection, etc.)

- Time consumed in preparing the material
- Time consumed in assembling & maintaining the required hardware
- Use of their personal electronic devices, accessories/peripherals and internet data
- Teaching practical subjects like Mathematics, Accountancy, Computers, etc. require step-by-step explanation for which face-to-face interaction is better.
- Difficult to refer to multiple pages simultaneously, required especially when solving problems.

Recommendations -

- Since the major factors influencing teachers' use of ICT is related to their perceptions, teachers should be provided ongoing training to educate them about the benefits of digital literacy.
- Teachers should be provided long-term training with the aim of providing them on-going exposure to ICT's so that they are able to select the most appropriate resources.
- Teachers should be provided with help in preparing material as the time consumed in it is one of the major discouraging factors. Peer networks or forums can be developed in collaboration with other teachers where the materials can be easily shared and productivity can be enhanced.
- Teachers must be provided with functioning technical infrastructure if they are to use ICT's effectively. Regular investment by the institution for the upkeep and development of technical equipments must not be considered as an expense.
- A certain part of the curriculum should be set aside to be taught compulsorily using ICT tools.

Conclusion -

'Change is the only constant' is not just a saying but a reality. The benefits which ICT offers can only be gained when teachers confidently explore the new opportunities without any resistance, which will exponentially enhance the learning environments.

The research through its exhaustive literature review and primary data analysis has revealed that though teachers find ICT helpful, they are most influenced by factors such as personal perceptions, behavioural attitudes, institutional tech support and external factors when they have to employ it for teaching purposes. It is only when these factors lean favourably towards ICT, competent digitally skilled teachers can fulfil their responsibilities.

There has been a paradigm shift in teaching methods in the past few years. Post Covid-19, though the conventional teaching models won't become obsolete, but they will have to be strongly supplemented by digital methods. The day has come when ICT is an indispensable tool of teaching and learning. With more training to build confidence and expand teachers' knowledge of new-technology driven practices, and support from the institution, the difficulties in the way of creating empowering online classrooms can be overcome.

Acknowledgements:

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