



BHARATA MATA COLLEGE THRIKKAKARA

Affiliated to MG University, Re-accredited by NAAC with 'A+' Grade, ISO 9001-2015 Certified

“INNOVATIVE APPROACHES TOWARDS TEACHING AND LEARNING THAT OCCURED DURING THE PANDEMIC”

Dissertation submitted in the Mahatma Gandhi University, Kottayam

in partial fulfilment of the requirement for the award of

Bachelor's degree of Arts

(ECONOMICS)

Submitted by

KRISHNAPRIYA UNNIKRISHNAN

REG NO : 200021012912

SREELAKSHMI RATHEESH

REG NO : 200021012917

UNDER THE GUIDANCE OF
ASST.PROF. LT NITHIN THOMAS

DEPARTMENT OF ECONOMICS

2022-2023

BHARATA MATA COLLEGE
DEPARTMENT OF ECONOMICS
(Affiliated to Mahatma Gandhi University – Kottayam)
THRIKKAKARA P.O, KOCHI- 682021, KERALA

DATE:

CERTIFICATE

This is to certify that this dissertation entitled “**INNOVATIVE APPROACHES TOWARDS TEACHING AND LEARNING THAT OCCURED DURING THE PANDEMIC**” has been prepared by **Krishnapriya Unnikrishnan** and **Sreelakshmi Ratheesh** under the supervision and guidance in partial fulfilment of the requirement for the award of the degree of Bachelor of Economics of the Mahatma Gandhi University.

They are allowed to submit the dissertation

DR. JOHNSON K M

Principal

Bharata Mata College, Thrikkakara

ASST.PROF. LT NITHIN THOMAS

Academic Guide

Dept. of Economics

PROF. LT NITHIN THOMAS

HOD of Economics Department

DECLARATION

We, Krishnapriya Unnikrishnan and Sreelakshmi Ratheesh Bachelor Degree of Economics final year students, Department of Economics, Bharata Mata College, Thrikkakara hereby declare that the dissertation submitted for award of Bachelor Degree in Economics is our work. We further declare the said work has not previously been submitted to any other University or Academic body.

Krishnapriya Unnikrishnan

Sreelakshmi Ratheesh

Place: Thrikkakara

Date:

ACKNOWLEDGEMENT

At the outset, we bow before **God** the almighty for this bountiful blessing without which we would not have completed this endeavour successfully.

We gratefully acknowledge our indebtedness to our respected HOD and academic guide Assit. Prof. Lt Nithin Thomas, for his meticulous guidance and encouragement throughout the project.

We remember with great pleasure and gratitude, all the respected teachers of the Department of Economics for their valuable suggestions.

We express our sincere thanks to our Principal Dr Johnson K M, for providing us all the facilities to carry out the project, as a part of under graduation course.

We are extremely indebted to our friends for their encouragement given in our tasks of preparing the dissertation report.

We extend our sincere gratitude to all those who has directly and indirectly helped during the course of our work.

Krishnapriya Unnikrishnan

Sreelakshmi Ratheesh

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE NO.
1.	INTRODUCTION 1.1. Statement of the problem 1.2. Significance of the study 1.3. Objectives of the study 1.4. Research methodology 1.5. Tools of analysis 1.6. Scope of the study 1.7. Limitations of the study	
2.	REVIEW OF PAST LITERATURE	
3.	INNOVATIVE APPROACHES TOWARDS TEACHING AND LEARNING THAT OCCURED DURING THE PANDEMIC	
4.	DATA ANALYSIS AND INTERPRETATION	
5.	FINDINGS AND SUGGESTIONS OF THE STUDY	
6.	CONCLUSION	
7.	BIBLIOGRAPHY	
8.	APPENDIX	

CHAPTER – 1

INTRODUCTION TO THE STUDY

“You see, we’ll never be able to compete in the 21st century unless we have an education system that doesn’t quit on children, an education system that raises standards, on education that makes sure there’s excellence in every classroom.”

- George W. Bush

Almost all Nations and Territories have been impacted by the Global COVID-19 pandemic outbreak. In Wuhan, China, the epidemic was first discovered in December 2019. The public was warned by nations around the world to be attentive in your care. The COVID-19 pandemic has forced a major shift in the way education is delivered, with many schools and universities transitioning to online and hybrid learning models. Universities across India as well as around the world moved to the virtual classes suspending physical classrooms. The epidemic raised concerns about the viability of private schools as well as the preparedness of the institutions, especially teachers. Yet, COVID-19 also served as a catalyst for the implementation of digital learning in the classroom. While this has presented many challenges, it has also led to the emergence of innovative approaches towards teaching and learning that have the potential to transform education in the long term. The reopening of schools in many states calls for the development of a comprehensive approach.

One of the most significant innovations has been the use of technology to deliver online learning. Teachers and students have had to quickly adapt to new platforms and software tools that enable real-time communication and collaboration. Videoconferencing platforms like Zoom and Google Meet have become ubiquitous, and many educators have embraced online tools like Google Classroom and Microsoft Teams to manage assignments and facilitate discussions.

Another innovative approach has been the use of asynchronous learning, which allows students to learn at their own pace and on their own schedule. This has been particularly helpful for students who are juggling work, family responsibilities, and other commitments, and who may not be able to attend classes at specific times. Online learning modules, pre-recorded lectures, and interactive learning materials have all been used to facilitate asynchronous learning. Collaborative learning has also been a focus of many educators during the pandemic. Teachers and students have been finding new ways to work together, even when physically apart. Group projects, online discussion forums, and virtual study groups have all been used to foster collaboration and peer-to-peer learning.

Online mode of teaching and learning is also a great remedy to continue learning even if another pandemic or economical changes/issues arises. It helps in the process of non-stop education. However, continuous online mode of teaching and learning also presents some challenges. One of the biggest challenges is ensuring that students have access to necessary technology and internet connectivity to participate in online learning. This can be a particular issue for students from disadvantaged background or those living in remote areas. Online learning can be isolating and students may struggle to stay motivated without the social interaction and support of their peers and teachers.

Finally, the pandemic has also led to a renewed focus on student well-being and mental health. Many educators have been using mindfulness practices, social-emotional learning, and other strategies to help students cope with the stresses of the pandemic and maintain their mental and emotional health.

Overall, the pandemic has been a catalyst for innovation in education, and many of the approaches and strategies developed during this time have the potential to transform teaching and learning in the long term.

1.1. SIGNIFICANCE OF THE STUDY

The COVID-19 pandemic has disrupted education systems around the world, forcing schools and universities to shift to online or hybrid learning models. This has led to the adoption of innovative approaches towards teaching and learning, such as the use of technology, new pedagogical methods, and creative solutions to address the challenges of remote education.

The significance of these innovative approaches lies in their potential to mitigate the negative impacts of the pandemic on education. By embracing new ways of teaching and learning, educators have been able to maintain continuity of education, provide students with access to learning resources and support, and keep them engaged and motivated despite the challenges of remote learning.

In addition, these innovative approaches have the potential to transform education in the long run by promoting new ways of teaching and learning that are more flexible, student-centred, and technology-enabled. As we move towards a post-pandemic world, the lessons learned from these innovative approaches can inform the development of more resilient and adaptable education systems that are better equipped to meet the needs of all learners, regardless of their location or circumstances.

Even if there are several online teaching and learning platforms, the practical knowledge and skills are limited. Many labs were closed during the pandemic to reduce the spread of the virus, which meant that students were unable to access the facilities they needed to conduct experiments and research. This has impacted the quality of their education and has made it challenging for students to complete their coursework and projects. Some students may have experienced delays in graduating as a result of the pandemic. With limited access to labs and other resources, it has been challenging for students to complete their research and projects within their original timelines.

1.2. STATEMENT OF THE PROBLEM

It is important to clearly define the specific problem related to lab operations and activities that the project aims to address. Without a clear problem statement, it can be difficult to develop effective strategies and solutions. Despite various efforts to continue teaching and learning through online classes, a significant proportion of students especially science and computer students those who faced several difficulties in acquiring practical knowledge and skills because of the pandemic.

Science and computer students typically require hands-on experience to develop their skills and knowledge. However, due to the pandemic, many students were unable to get the hands-on experience they needed, which has impacted their ability to learn and gain practical skills.

Some of the problems faced by the students:

- 1) Lack of hand-on experience.
- 2) Lack of in-person interactions.
- 3) Lack of Observation and experimentation.
- 4) Not receiving clear and proper instructions.
- 5) Lack of concentration.

1.3. OBJECTIVES OF THE STUDY

The objectives of innovative approaches towards teaching and learning during the pandemic are as follows:

- The primary objective of innovative approaches towards teaching and learning during the pandemic is to ensure that students are able to continue learning despite the disruptions caused by the pandemic.
- Innovative approaches towards teaching and learning aim to increase the accessibility of education by using technology and other tools to reach a wider range of students.
- Innovative approaches towards teaching and learning during the pandemic aim to foster flexibility in education by allowing students to learn at their own pace and providing multiple pathways for learning.
- To ensure whether the students are able to carry out lab experiments and activities during the pandemic.
- Remedies to improve virtual classroom experience.

1.4. RESEARCH METHODOLOGY

The data collection is expected to be administered with a sample size of 100 respondents selected by applying convenience sampling method. The study is largely based on primary data such as questionnaires.

>SAMPLING DESIGN

A well-structured questionnaire is used to gather information from students and teachers, who represent the main source of primary data.

Overall a well-designed research methodology is critical to ensuring that research results are reliable, valid and useful for informing decision making and advancing knowledge in a particular field.

1.5. TOOLS OF ANALYSIS

The data will be analysed using Microsoft Excel. Percentage analysis is proposed to be used. The findings will then be represented with the help of tables and charts for easy understanding and interpretation. Questionnaire was prepared by using the tool named Google Forms as it can summarize the survey results at a glance.

1.6. SCOPE OF THE STUDY

The study focuses only on students in Ernakulam district, Kerala. The study encompasses on selected group of Higher Secondary school students to Post Graduate students. We give a special concentration on Lab (Computer and Science labs) operations and activities that had a massive change during the pandemic.

1.7. LIMITATIONS OF THE STUDY

- In questionnaires, there is a high chance that the respondents ignore certain questions or might not feel that it is important to be answered. There is also a chance of personal bias.

Since the study is focused on a particular area, there is a chance of getting plenty responses.

Since the questionnaires are mostly send online, we are unable to know how honest and accurate the responses are.

Time constraints permit only limited number of responses.

CHAPTERISATION SCHEME

- **CHAPTER 1 : INTRODUCTION**
- **CHAPTER 2 : REVIEW OF LITERATURE**
- **CHAPTER 3 : DATA ANALYSIS AND INTERPRETATION**
- **CHAPTER 4 : FINDINGS AND SUGGESTIONS**
- **CHAPTER 5 : CONCLUSION**
- **CHAPTER 6 : BIBLIOGRAPHY**
- **CHAPTER 7 : APPENDIX**

CHAPTER - 2

REVIEW OF LITERATURE

Turgut Karakose in his paper “*The impact of the COVID-19 epidemic on higher education: Opportunities and implications for policy and practice*” published on March 2021 says that aside from a number of psychological, sociological, political, and economic issues, the COVID-19 pandemic has resulted in drastic changes in education systems around the world, and the current epidemic has likely revealed the largest education catastrophe in human history. The COVID-19 pandemic also provided enormous chances for higher education to be redesigned and better teaching-learning practises to be developed and implemented. The goal of this paper is to look at the global impact of the COVID-19 epidemic on higher education. This article is a survey of the literature on the COVID-19 epidemic and higher education. This paper aims to motivate both researchers and practitioners to do future research on COVID-19 and higher education. In this context, the responses of higher education institutions to the current pandemic-caused global education crisis were analysed, and some solution recommendations for policymakers and higher education professionals were established. As a result of the COVID-19 epidemic, the global education community recognised that the rapid adoption of an online emergency remote teaching approach was both required and unavoidable.

Linda Darling-Hammond and Marie E. Hyler in their paper “*Preapring educators for the time of COVID... and beyond*” published on 4 September 2020 stated that due to the COVID-19 epidemic, even more work is required to meet students' academic and social emotional requirements, make up for lost learning, and get ready for the unpredictable interactions between online, blended, and in-class learning. The bar for educators and educator training has been raised as a result of these expectations and the requirement for a stronger emphasis on equity-focused teaching and learning. This essay investigates the strategies that educators and policymakers might use to help teachers meet the social, emotional, and academic requirements of pupils. Investing in high-quality educator preparation, adapting professional development opportunities for educators to meet contemporary requirements, encouraging mentoring and the development of new teacher roles, and setting aside time for educators to collaborate with one another are some of these measures.

Utsav Raj and Shivank Khare in their paper *“Indian Education System In Fight Against COVID-19 Pandemic”* published on 11 January 2021 says that the lockdown that followed the coronavirus pandemic led schools and colleges to temporarily close across India; despite the government's and the national government's best efforts to support e-learning and online education, this unprecedented action left a large void in the educational system. With a comprehensive network of about 1.4 million schools, 993 Universities, 39931 Colleges, and 10725 Stand-Alone Institutions listed on the AISHE web page, India has one of the most significant education sectors in the world. because courses and an offline system dominated the Indian educational system. The majority of primary and secondary education sectors, which previously supported an offline education system, must now choose online courses to advance education and benefit from their benefits.

Warren Kidd and Jean Murray in their paper *“The COVID-19 Pandemic and its effects on teacher education in England: how teacher educators moved practicum learning online”* published on 9 September 2020 states that Many pre-service students had just started their final practicum when the Covid-19 outbreak forced the closure of institutions and schools in England. This study focuses on the difficulties it presented to teacher educators. The article investigates how pedagogies changed as learning communities were moved to new online places as a result of the removal of the practicum using qualitative research techniques and notions from spatial geography. A teacher's 'pedagogic agility' allowed for a rapid modification in established practises. Many practises' guiding principles and 'intentionalities', as well as the teacher educators' orienting ideals, stayed the same despite the move to newly created online places. Overall, several of the creative pedagogies created at the local level had a feeling of both similarity and uniqueness.

Linor L. Hadar, Oren Ergas, Bracha Alpert and Tamar Ariav in their paper *“Rethinking teacher education in a VUCA world: student teachers’ social-emotional competencies during the COVID-19 crisis”* published on 11 August 2020 clearly shows that The necessity to prepare pupils for what has been dubbed a VUCA (volatile, uncertain, complex, ambiguous) environment has been emphasised in policy statements from the OECD and UNESCO. They underline the need of social and emotional skills in dealing with such circumstances. This qualitative study uses the COVID-19 outbreak as an extreme VUCA case to examine whether our teacher preparation programme equips future teachers with the social-emotional skills that they are expected to demonstrate and that are essential for dealing with such situations.

Open-ended questionnaire responses from 54 student teachers and 24 teacher educators were evaluated using grounded theory, as were 16 semi-structured interviews with teacher educators. Results show that our student teachers struggle greatly under VUCA conditions and don't seem to get enough preparation.

T. Muthuprasad, S. Aiswarya, K.S Aditya and Girish K. Jha in their paper “*Students’ perception and preference for online education in India during COVID-19 Pandemic*” published on 4 January 2021 states that in response to the COVID-19 pandemic jeopardising the academic calendars, educational institutions all around the world have shut down. To continue academic activities, the majority of educational institutions have switched to online learning platforms. However, there are still many unanswered problems regarding the readiness, planning, and effectiveness of e-learning, particularly for a developing nation like India where the technical limitations like appropriate device selection and bandwidth availability present significant difficulties. Through an online survey of 307 students, the goal of this study is to investigate how agricultural students perceive and enjoy online learning. In order to create an efficient online learning environment, it was also investigated what characteristics of online classrooms students like. The findings showed that the majority of respondents (70%) are prepared to choose online courses to handle the curriculum during this epidemic. For online study, the vast majority of students favoured using smartphones. In order to increase the effectiveness of learning, we discovered through content analysis that students prefer recorded classes with a quiz at the end of each session. In contrast, broadband connectivity challenges in remote locations make it difficult for students to take advantage of online learning efforts. The students expressed their opinion that the flexibility and convenience of online classes made them an appealing option. The insights from this article are likely to be useful in creating the curriculum for the new normal in agricultural education systems, where switching totally to online mode may not be practicable because many courses are practical in nature.

Ambika Selvaraj, Radhin Vishnu, Nithin KA, Noel Benson and Arun Jo Mathew in their paper “*Effect of Pandemic based online education on teaching and learning system*” published on September 2021 discusses that globally, the majority of industries were affected by the pandemic caused by a coronavirus epidemic. This applies to the academic community as well, where there are millions of students and teachers who are actively engaged and who formerly attended regular classes in their institutions but were forced to stay at home owing to the pandemic.

Online courses were implemented in the majority of nations, including India, to further the educational process. Through electronic gadgets, which are still quite new to the teaching-learning community as a whole, both teaching and learning take place in this method. This investigation sought to learn how Indian teachers and students experienced online learning. Additionally, it made an effort to comprehend user experience as well as the particular difficulties that come with this form of instruction. There were four different surveys made for college students, college professors, and school teachers. The questions included a wide range of topics related to online education, including setting up home-based online education, knowledge transfer, comfort, evaluation, and future implications. The survey was distributed electronically using Google Forms. A variety of educational institutions around the nation received the replies from educators (school teachers and college professors taking into account all courses) and students (school and college students taking into account all courses). The results of the data compilation were examined in two ways: first, from the viewpoints of the teaching versus the learning group, and second, from the perspectives of the school against the college groups on the online versus traditional classes. Despite the fact that online training and distance learning have been around for a while, there hasn't been much research on these topics. This study is the first of its type and examines the advantages and disadvantages of the new normal of home-based online education in India using the combined opinions of professors and students. The study discusses the benefits and drawbacks of online learning over traditional classes as reported by the participants. This provides more insight into how to enhance technology to increase their efficiency. This study also provides a sound framework for modifying or developing educational legislation, policies, and programmes to ensure that everyone has equitable access to resources.

Lokanath Mishra, Tushar Gupta and Abha Shree in their paper *“Online teaching-learning in higher education during lockdown period of COVID-19 Pandemic”* published on 10 September 2020 stated that, in India and in many other countries throughout the world, the whole educational system—from primary to postsecondary levels—has crumbled during the COVID-19 lockdown period. The purpose of this study is to provide an overview of the online teaching-learning strategies used by the Mizoram University for its teaching-learning programme and following semester exams. It anticipates a chance for future academic decision-making that is intellectually stimulating in the face of any difficulty. In light of the COVID-19 pandemic, this paper's intended purpose is to discuss the essentials of online teaching and learning in the classroom as well as how existing educational institution resources can successfully convert traditional classroom instruction into online education with the aid of virtual classrooms and other essential online resources in this

constantly changing educational environment. In addition to highlighting the deployment of online teaching-learning modes, the paper uses both quantitative and qualitative methods to investigate how teachers' and students' perspectives of these modes compare. The purpose of this paper is to create a comprehensive picture of the ongoing online teaching and learning activities during the lockdown period, including establishing the relationship between change management and online teaching and learning in the context of the COVID-19 outbreak, in order to address the ongoing academic disruption and, as a result, ensure the resume of educational activities and discourses as per usual in the educational system.

Gautam Kumar, Gulbir Singh, Vivek Bhatnagar, Rajeev Gupta and Sushil Kumar Upadhyay in their paper “*Outcome of Online teaching-learning over traditional education during COVID-19 Pandemic*” published on September-October 2020 studies on the goal of this research is to evaluate the impact, challenges, and tools of online teaching-learning in various higher educational bodies (colleges/universities) across India. From the 29th of June to the 20th of July, 2020, an online survey was performed. The questionnaire includes closed-ended questions with multiple-choice answer alternatives for quantitative analysis. During the inquiry, it was discovered that online teaching played a critical role in education during the COVID-19 epidemic, but that a lack of resources and sufficient training are the key challenges during ICT-based/Online teaching-learning. The difficulty in selecting a great tool for teaching-learning electronically was the reason that it could not be as effective as the traditional education system. This research will assist government officials and educational institutions in developing a training/advisement programme for students and teachers to address the difficulties identified in the study. It will contribute to making online education a more appealing and powerful medium for teaching and learning activities that ensure the development of young scholars' skill sets and employability.

Malik Mubasher Hassan, Tabasum Mirza and Dr. Mirza Waseem Hussain on their paper “*A Critical Review by Teachers on the Online Teaching-Learning During the COVID-19*” published on 8 October 2020 states that the current COVID-19 epidemic has caused a rapid shift in the methods of instruction and learning around the world. The worldwide lockdown to ensure preventive steps to avoid the spread of this sickness has affected the school sector as well as other economic sectors. As we all know, quality education is the only long-term solution to all of the challenges, and thus the need to find an alternative solution to traditional classroom teaching-learning is the concern of all stakeholders, and the only option found is online mode of teaching-

learning, which was already available and had attracted a lot of attention during this period. The purpose of this paper is to investigate teachers' perspectives on this method of learning in India, as well as the challenges and issues they faced in migrating to an online platform, their experiences with online tools/platforms used for providing instruction, and their recommendations to improve the process for classroom effectiveness. This research will aid in acquiring insight into possible improvements in the current manner of online education as well as in future situations. The results acquired based on sample collection via web-based questionnaire obviously provide some information, which might be an eye opener for improving the implementation of online teaching and learning among learners, particularly teachers, who can further assist in the large-scale implementation. Even though the online mode had long been in place and was used in combined form to a significant extent in developed countries, in developing countries like India, teachers lack the knowledge and skills to manage the online ICT infrastructure in a challenging situation because they are not familiar with online platforms/tools. The findings suggest the necessity for professional development that places a particular emphasis on developing digital literacy abilities and raising teacher community understanding of the advantages of online learning environment.

Preeti Sheba Hepsiba Darius, Edison Gundabattini and Darius Gnanaraj Solomon on their paper *“A Survey on the Effectiveness of Online Teaching- Learning Methods for University and College Students”* published on 5 April 2021 states that the world-class universities have used online teaching and learning techniques for more than ten years to meet the needs of students who live far from colleges and universities. However, during the COVID-19 pandemic, online teaching and learning benefited practically all institutions, universities, and affiliated students. An online poll is being used to try and determine how well online teaching and learning techniques work with university and college students. University and college students have been given a specially created questionnaire. A total of 450 students from different universities, engineering schools, and medical schools in South India participated in the survey and provided responses. It was discovered that the following strategies encourage efficient online learning: animations, digital peer collaborations, video lectures from subject-matter experts, online quizzes with multiple-choice questions, accessibility to student versions of software, a comfortable environment at home, faculty interactions during lectures, and online materials provided by the faculty. Additionally, PPTs are presented to every student in front of the class, lectures are heard by everyone at the sound level of their choice, and walking or travelling to class is not necessary with online classes.

Pradip Kumar Das on his paper *“Impact of Pandemic COVID-19 on Higher Education-Indian Context”* published on 16 June 2021 states that India's and the world's education levels are the lowest affected by Covid-19 and placed under lockdown, having a negative impact on academic life. In India, a large number of students stopped transferring between educational institutions, and all pedagogies came to an end. Disaster has acted as a catalyst for educational institutions to cultivate and select platforms using technologies that were previously untried. The education industry has found it difficult to navigate the storm with different strategies and digitizing the difficulties to swarm the pandemic's threats. The digital education hypothesis is expected to have a long-term impact on higher education initiatives. Despite the fact that digital learning is a fun experience for those with limited skills, research shows that a variety of illiberalities participate. The academy only offers insecure jobs to learners who are under pressure. The area that conventional study would climatically cover with digital research is still up for debate. The Covid-19 challenge has exposed prior issues and discrepancies clamouring synergetic attempts to think about even so pandemic's strategy. The purposeful paper discusses the benefits and drawbacks of Covid-19 while illuminating the insufficiently perfect education in India. The paper also makes a methodical contribution to the substantiation of the experience and lessons learned from the pandemic's effects on the landscape of transitional education, as well as the distribution and adoption of e-learning in the educational setting. In order to meet didactics during the pandemic contingency, a few recommendations for policies have also been prepared.

Mr. LalitKumar Premchandra Patil and Dr. Hires S. Luhar on their paper *“An Overview of Indian Higher Education System: During and After COVID-19 Pandemic Period”* published on 11 April 2021 states that globally and domestically, the continuing Covid-19 pandemic is expanding. The entire educational system of the nation is negatively impacted by it. We have not been able to fully escape this challenging circumstance up to this point, and it is unclear when the entire planet will. Everywhere in the nation, almost all educational institutions are closed, and teaching and learning are conducted online. Looking at everything, it appears that there will be a lot of hurdles in the future, yet even with all of these difficulties, higher education institutions managed to maintain their level of learning and teaching. Students can obtain education with the help of the internet and information technologies. This study's major goal is to examine how technology is improving the educational system. There are plenty of resources available for learning and teaching at higher education institutions in India. New techniques, tools, trends, and technologies for learning have arrived. The scholars have also suggested how, post-Covid-19, education can be delivered to all pupils in India using a system of advanced teaching through higher education

learning and innovative teaching methods (technology). All pupils will receive instruction, including online instruction. There have also been some ideas for improving educational activities in the event of the Covid-19 pandemic.

Amit Joshi, Muddu Vinay and Preeti Bhaskar on their paper *“Online Teaching amidst COVID-19 in India: An Outlook”* published on 28 November 2020 states that the education institutions all around India were forced to close permanently as a result of the lockdown that was imposed on March 25, 2020. The government and educational institutions reacted quickly, switching the manner of instruction from offline to online. This article tries to discover the strategies used by higher education institutions to continue educating students while they are under lockdown. The difficulties teachers confront when doing home-based online instruction are also mentioned in the essay. Data were gathered for the study, which is descriptive and analytical in nature, from secondary sources including reports, news stories, blogs, interview videos, magazines, social media, and journals to meet the paper's objectives. The article supports the process of learning for the future in order to deal with any future crises that may affect India's educational system, according to information from secondary sources. The results showed that HEIs have undertaken numerous attempts to provide education in this pandemic situation. However, from a teacher's perspective, these measures haven't really been a success. Teachers encountered a variety of difficulties when teaching online, including a lack of technological resources, family disruptions, a lack of training, a lack of direction and clarity, and a lack of technical expertise. The article's learning curve enables HEIs to assist in effectively implementing the online educational.

Silvia K. Bartolic, David Boud, Jenilyn Agapito, Dominique Verpoorten, Siobhan Williams and Louise Lutze-Mann on their paper *“A multi-institutional assesment of changes in higher education teaching and learning in the face of COVID-19”* published on 9 August 2021 stated that the higher education's approach to teaching and learning has been significantly impacted by COVID-19. There was a dramatic shift almost everywhere as instructors switched emergency remote education, which was primarily delivered online, from primarily face-to-face teaching and learning. All faced fresh difficulties, albeit specifics differed depending on the faculty members, institutions, and nations. On teaching and learning in higher education, they look at the immediate effects of COVID-19. Our findings are based on a sample of 309 courses and the academic staff that taught them from eight colleges and institutions with varied contexts and sizes across four continents. They begin by examining the differences between institutions and their instructors in

terms of how well they were able to adapt to the teaching and learning pivot brought on by the COVID-19 survey. They also show that there was little systematic patterning in how academic staff were able to adjust, save for nimbleness, because of the pandemic's abrupt start and the swift response this required of instructors. Because of the speed of reaction, variations were, at least in terms of how individual faculty members responded, much more idiosyncratic than systematic.

CHAPTER - 3

INNOVATIVE APPROACHES TOWARDS TEACHING AND LEARNING THAT OCCURED DURING THE PANDEMIC



The COVID-19 pandemic has forced educators to adopt innovative approaches to teaching and learning. Here are some examples:

Online Learning: One of the most common approaches has been the shift to online learning. Educational institutions have been using online platforms to provide classes and connect with students. This approach has enabled learners to continue their studies from the safety of their homes.

Hybrid Learning: Hybrid learning combines online and in-person instruction. It involves a combination of synchronous and asynchronous learning, and it can be an effective approach for students who struggle with fully online or fully in-person learning.

Flipped Classroom: In a flipped classroom, students watch videos or read materials before class, and then use class time for discussion, collaboration, and hands-on activities. This approach allows teachers to focus on higher-order thinking skills and promotes student engagement.

Project-Based Learning: Project-based learning involves students working on real-world projects that are relevant to their interests and their communities. This approach can foster creativity, problem-solving, and critical thinking.

Gamification: Gamification involves using game-like elements in the learning process. This approach can make learning more engaging and motivating for students, and can help them develop important skills such as teamwork, decision-making, and time management.

Personalized Learning: Personalized learning involves tailoring instruction to meet the unique needs and interests of individual learners. This approach can help students feel more invested in their learning and can lead to better academic outcomes.

Social and Emotional Learning: Social and emotional learning involves teaching students skills such as self-awareness, self-regulation, empathy, and relationship-building. This approach can help students cope with the stresses of the pandemic and build resilience.

Overall, the pandemic has accelerated the adoption of new teaching and learning approaches, and many of these innovations are likely to continue beyond the pandemic.

Such online teaching and learning platforms are:-

Google Meet:

Google Meet is a video conferencing platform developed by Google. It allows users to conduct online meetings, webinars, and virtual events with a range of features such as screen sharing, chat messaging, and the ability to join meetings from any device with an internet connection. Google Meet is commonly used for remote work, online learning, and virtual social events. It is available for free to users with a Google account, and there is also a paid version called Google Workspace that includes additional features and functionality.

Google Meet has been instrumental in helping people stay connected during the COVID-19 pandemic. With social distancing measures in place, many people have had to work, learn, and socialize from home, and video conferencing tools like Google Meet have made this possible.

Google Meet allows users to conduct virtual meetings with colleagues, classmates, and friends from any location with an internet connection. This has been particularly important for remote work and online learning, as it allows people to collaborate and communicate effectively despite not being physically present in the same location. Additionally, Google Meet provides features such as screen sharing and chat messaging, which can enhance collaboration and engagement during virtual meetings.

Google Meet has also helped to facilitate remote healthcare services during the pandemic, as doctors and other healthcare professionals can conduct virtual consultations with patients using the platform. This has been important for maintaining access to healthcare services while minimizing the risk of infection.

Overall, Google Meet has played an important role in helping people to stay connected and productive during the pandemic, and it has demonstrated the potential of virtual communication tools to support remote work, learning, and socialization.



Zoom:

Zoom is a video conferencing tool that has become increasingly popular during the COVID-19 pandemic as people around the world have been forced to work, study, and socialize from home. The platform has helped to facilitate communication and collaboration between individuals and groups in various contexts, from business meetings to virtual classrooms and social events.

One of the primary benefits of Zoom is its ability to connect people in real-time, regardless of location. This has been particularly important during the pandemic, as people have had to isolate and maintain social distancing to prevent the spread of the virus. Zoom allows individuals to connect with others without physically being in the same room, making it a valuable tool for remote work, remote learning, and virtual social gatherings.

In addition to its basic video conferencing features, Zoom also offers a range of collaboration tools that have helped to enhance productivity and engagement in various contexts. These include screen sharing, virtual backgrounds, recording, and breakout rooms, which allow participants to collaborate in smaller groups during larger meetings or classes.

Overall, Zoom has been a valuable tool during the pandemic, helping individuals and organizations to stay connected and productive despite the challenges posed by remote work and social distancing.



Google Classroom:

Google Classroom is a free web-based platform developed by Google for schools that aims to simplify the process of creating, distributing, and grading assignments in a paperless way. It is especially useful during the pandemic as it allows teachers to manage their classes and communicate with students remotely, ensuring that education can continue even when schools are closed or students are unable to attend in person.

Some ways that Google Classroom has helped during the pandemic include:

Easy distribution of assignments and resources: Teachers can upload assignments, notes, and other resources to the platform, which students can access from anywhere with an internet connection.

Seamless communication: Google Classroom allows teachers to send announcements, reminders, and feedback to students, and students can ask questions and collaborate with their peers.

Streamlined grading: Teachers can grade assignments online, and the platform calculates grades automatically, reducing the time and effort required for grading.

Increased organization: Google Classroom provides a central hub for all class-related information, making it easy for both teachers and students to stay organized and on top of assignments.

Overall, Google Classroom has been a valuable tool for teachers and students during the pandemic, helping to ensure that education can continue despite the challenges of remote learning.



Google Classroom

Webex:

Webex is a web-based video conferencing and collaboration platform that has been widely adopted by educational institutions to facilitate remote learning during the COVID-19 pandemic.

Here are some ways in which Webex has helped the education system during this challenging time:

Remote learning: With schools and universities closed due to the pandemic, Webex has enabled students and teachers to connect virtually and continue learning from home. Webex allows teachers to conduct virtual classes and lectures, share presentations, and use whiteboards to explain concepts.

Interactive sessions: Webex also enables teachers to conduct interactive sessions with students. Teachers can use the platform's features such as breakout rooms, polls, and quizzes to engage students and test their understanding of the material.

Recordings: Webex allows teachers to record their virtual classes and lectures, making it possible for students who miss the live session to catch up later. This also enables students to revisit the material and review difficult concepts at their own pace.

Collaboration: Webex also enables students to collaborate on group projects and assignments remotely. The platform provides tools such as screen sharing, file sharing, and virtual whiteboards that make it easier for students to work together and stay on task.

Accessibility: Webex is accessible from a variety of devices, including desktop computers, laptops, tablets, and smartphones. This makes it easy for students to access their classes and course materials from anywhere, at any time.

In summary, Webex has played a crucial role in facilitating remote learning during the pandemic. It has enabled teachers to conduct virtual classes and lectures, engage with students, collaborate on projects, and ensure that students can access course materials from anywhere.



Even if there are several online teaching and learning platforms, the practical knowledge and skills are limited. The COVID-19 pandemic has had a significant impact on students studying in laboratories, particularly those studying science and computer-related fields.

Here are some of the ways in which the pandemic has affected these students:

Limited Access to Labs: Many labs were closed during the pandemic to reduce the spread of the virus, which meant that students were unable to access the facilities they needed to conduct experiments and research. This has impacted the quality of their education and has made it challenging for students to complete their coursework and projects.

Limited Hands-on Experience: Science and computer students typically require hands-on experience to develop their skills and knowledge. However, due to the pandemic, many students were unable to get the hands-on experience they needed, which has impacted their ability to learn and gain practical skills.

Delayed Graduation: Some students may have experienced delays in graduating as a result of the pandemic. With limited access to labs and other resources, it has been challenging for students to complete their research and projects within their original timelines.

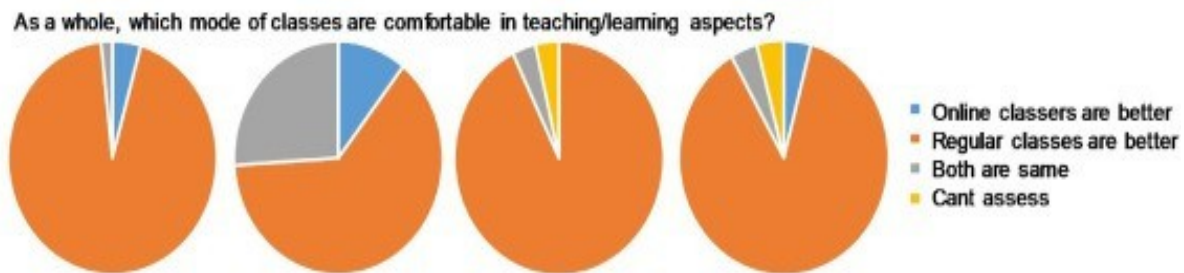
CHAPTER – 4

DATA ANALYSIS AND INTERPRETATION

DATA ANALYSIS

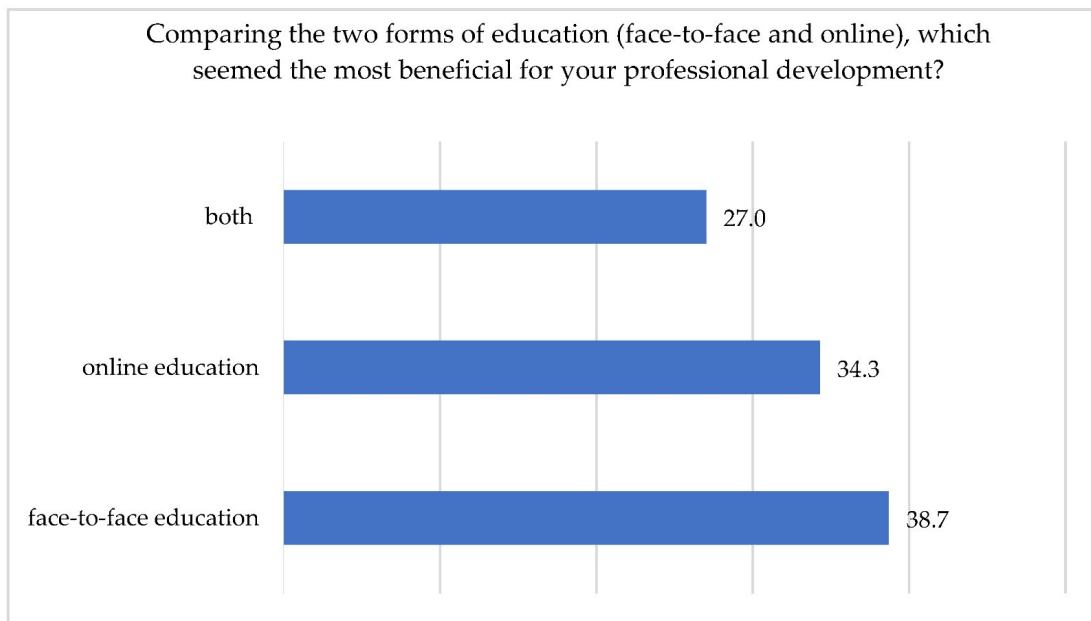
This chapter presents the analysis of various Research information that has already been obtained and is available as secondary data. Primary data, which is information gathered directly from its source, is in contrast to the phrase. Secondary data is utilised to expand the sample size of research projects and is also preferred since it is quicker and more efficient to employ an already existing resource. Large-scale research efforts that involve numerous research groups working together to acquire secondary data are made easier by the use of secondary data. The primary researcher is thus free to concentrate on secondary research or particular areas of interest. The separation of labour speeds up research.

Secondary data are frequently gathered by public service departments of governments, libraries, internet searches, and censuses like the US Census.



According to the students survey in 2020, the study says that majority of the (respondents) students and teachers are most comfortable attending regular classes (physical mode of teaching and learning) than that of online mode of teaching and learning. Only a few respondents feel both the modes are comfortable.

The majority of the students were likely not considering substituting online classes for their normal sessions because they were so habituated to taking traditional classes. As a result, we can draw the conclusion that, in terms of learning, online classes now fall short of normal classes.



According to the study in 2022, we came to understand that this outcome is intriguing considering that the teachers and students made different decisions when asked about their desired educational setting, therefore, there is now a change in the adaptability of teachers and students, when comparing to that of 2020 outcome. Many of the teachers and students are getting used to online classes and are comfortable with it.

As the graph given above, we can see that most of the respondents chose face-to-face education owing to 38.7%, while a proportion of 34.3% of respondents choosing online education and a percentage of 27 chose both the mode of education.

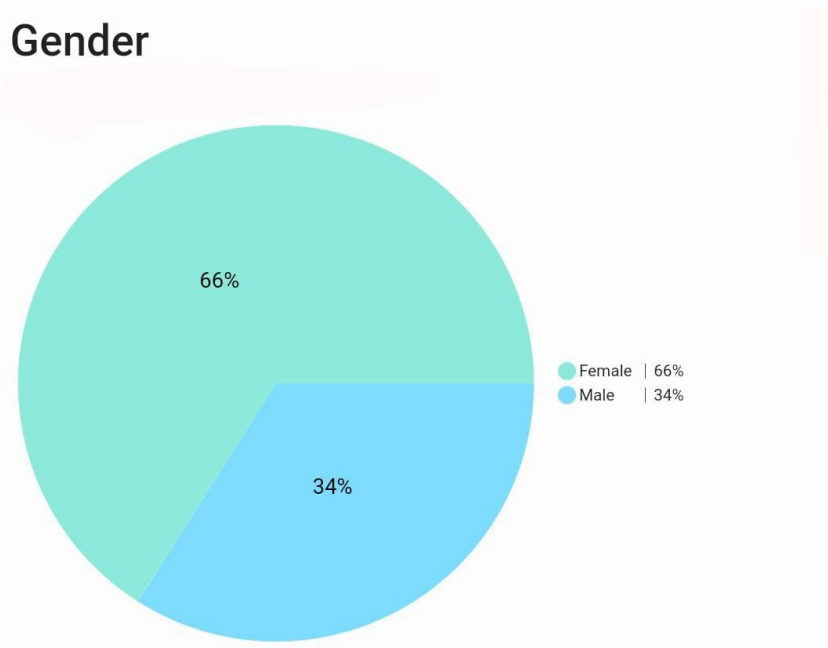
Even if online mode of teaching and learning is getting comfortable comparing to 2020, there is still certain limitations – such as, lack of lab experiments, lack of observation, lack of concentration, face-to-face interactions, etc. Due to these reasons, face-to-face education is still higher compared to online education.

INTERPRETATION OF DATA

This chapter summarizes the data we collected through an online survey using Google Form of a selected sample of 100 participants. The data collected is primary (first hand information) as it is directly collected from the source. Various interpretation made from the collected data has been discussed below:

GENDER

Gender	Frequency	Percentage (%)
Male	34	34%
Female	66	66%
Other	0	0%
TOTAL	100	100%



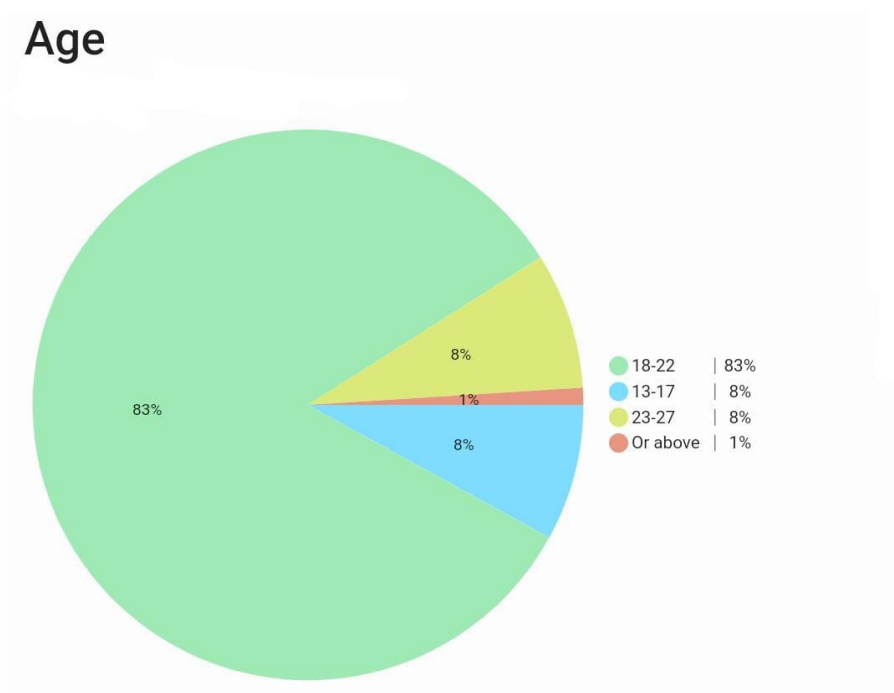
INTERPRETATION:

From the data collected from 100 respondents, it was observed that majority of the students were Females owing to 66% of the total respondents indicating more than half of the sample size.

Males owing to 34% of the total respondents.

AGE

Age	Frequency	Percentage (%)
13-17	8	8%
18-22	83	83%
23-27	8	8%
Or above	1	1%
TOTAL	100	100%



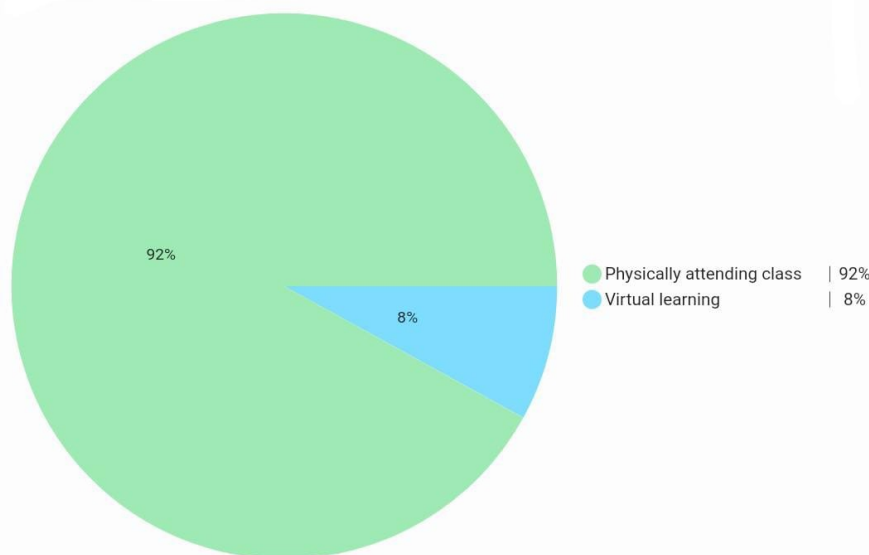
INTERPRETATION:

Majority of the students belongs to the age group of 18-22 years owing to 83% of the total respondents indicating more than half of the sample size. The next majority age group of the respondents were 13-17 and 23-27 with an equal percentage owing to 8% and the remaining 1% of respondents belong to the age group that is above 27 years.

WHAT DO YOU PREFER, VIRTUAL LEARNING OR PHYSICALLY ATTENDING CLASS?

Preference	Frequency	Percentage
Virtual learning	8	8%
Physically attending class	92	92%
TOTAL	100	100%

What do you prefer, virtual learning or physically attending class?

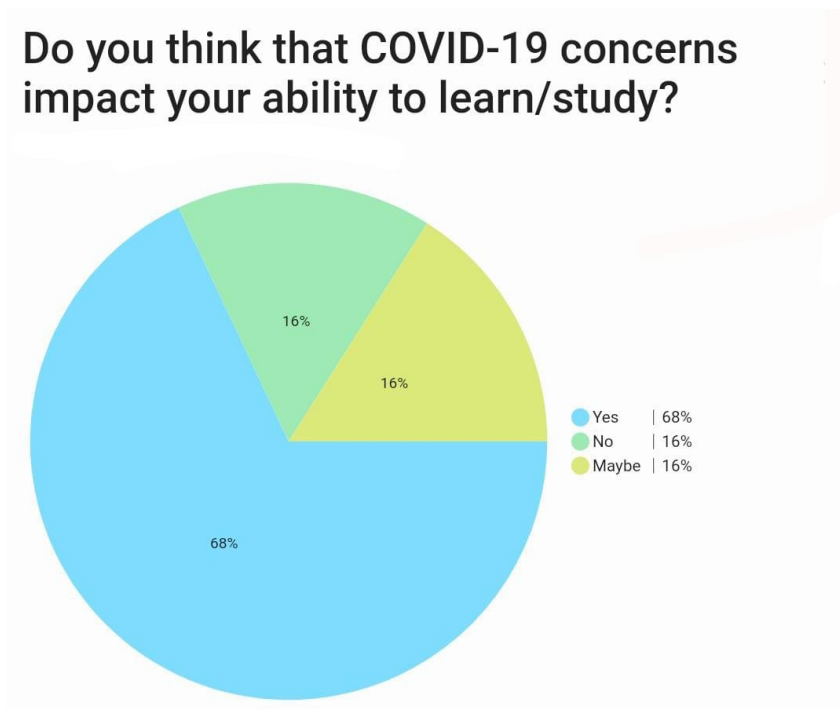


INTERPRETATION:

From the collected data, we could understand that majority of the respondents supported physically attending class owing to 92% than that of virtual mode of learning that is owing to 8%. Therefore, we came to know that most of the students are interested in physical mode of learning comparing to online learning sessions.

DO YOU THINK THAT COVID-19 CONCERNS IMPACT YOUR ABILITY TO LEARN/STUDY?

Concerns	Frequency	Percentage (%)
Yes	68	68%
No	16	16%
Maybe	16	16%
TOTAL	100	100%



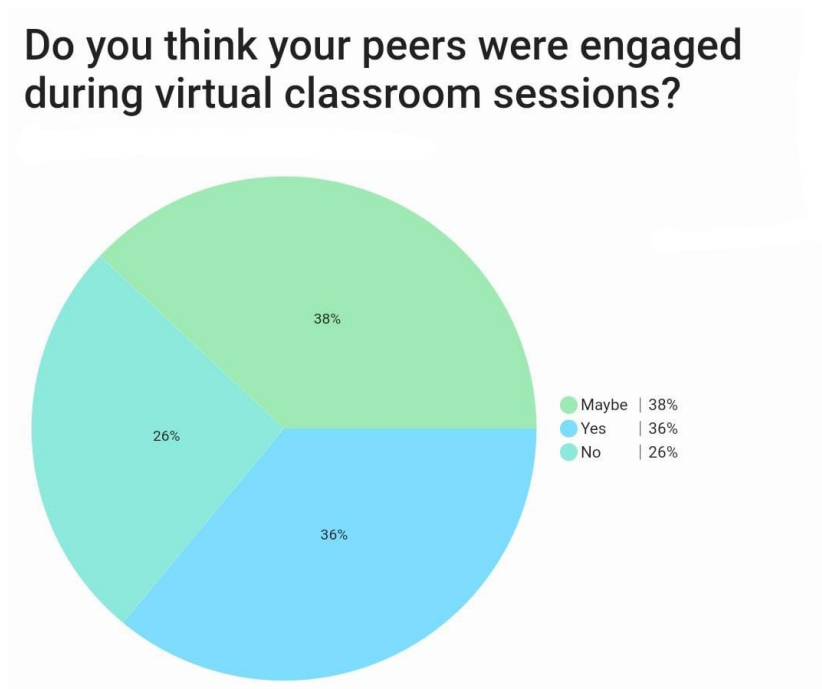
INTERPRETATION:

According to the 100 respondents we could learn that majority of the students have negatively impacted by the pandemic owing to a high percentage of 68 and the other proportion of students are merely impacted and not at all impacted by the pandemic owing to a equal percentage of 16.

From this we can learn that even if most of the students are impacted by the pandemic, there is a 32% (i.e; 16+16) of students recovering and fully not affected by the outbreak of corona virus.

DO YOU THINK YOUR PEERS WERE ENGAGED DURING VIRTUAL CLASSROOM SESSIONS?

Aware	Frequency	Percentage (%)
Yes	36	36%
No	26	26%
Maybe	38	38%
TOTAL	100	100%



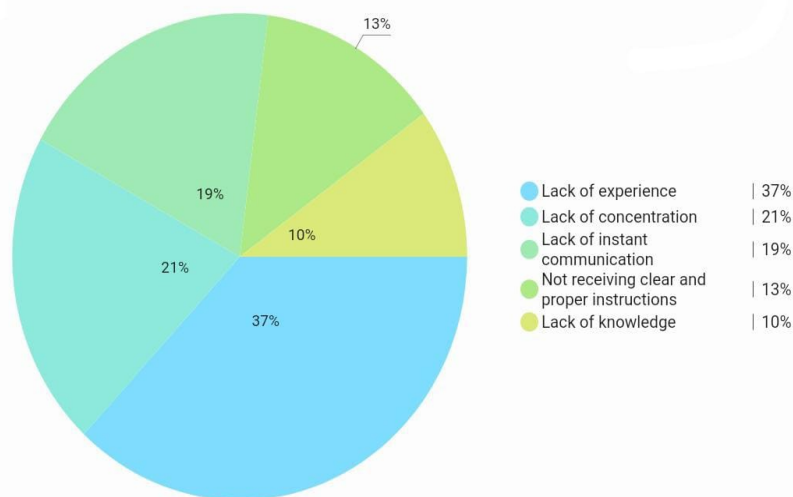
INTERPRETATION:

As the chart above shows, a majority of the respondents (38%) say that there might have been instances where they found it hard for their peers to carry out their virtual classroom sessions during the pandemic. While 36% of the respondents have felt it hard to cope up with the virtual classroom sessions and 26% of the respondents have not at all felt any difficulties.

HOW HAS YOUR LAB EXPERIENCE CHANGED COMPARED TO PRE-PANDEMIC TIMES?

Experience	Frequencies	Percentage (%)
Lack of experience	37	37%
Lack of concentration	21	21%
Lack of instant communication	19	19%
Not receiving clear and proper instructions	13	13%
Lack of knowledge	10	10%
TOTAL	100	100%

How has your lab experience changed compared to pre-pandemic times?



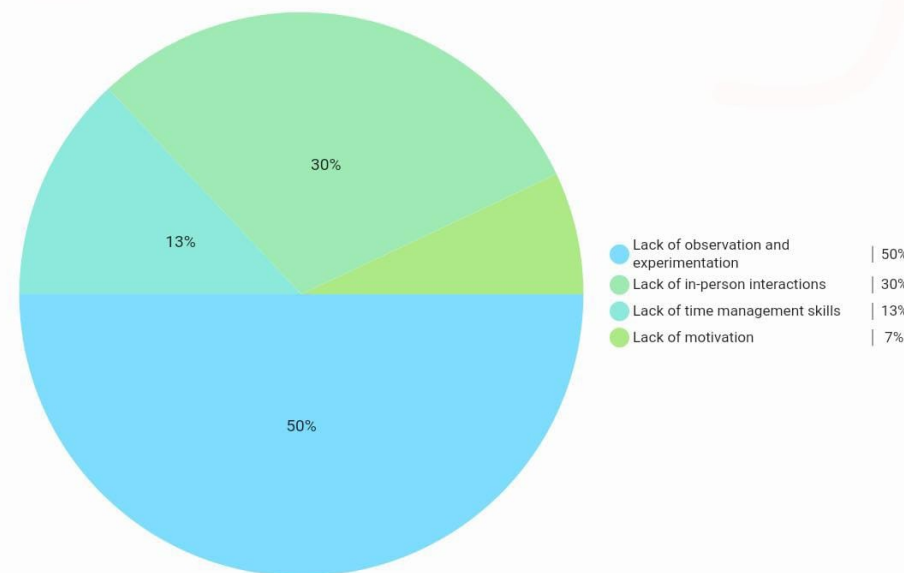
INTERPRETATION:

According to the chart above, a majority of the respondent’s lab experience have changed compared to pre-pandemic times in terms of Lack of experience being the highest, owing to 37%. Followed by Lack of concentration owing to 21% and Lack of instant communication owing to 19%. The least respondents are unable to receive clear and proper instruction owing to 13% and experience Lack of knowledge owing to 10%.

HOW DID VIRTUAL MODE OF LEARNING AFFECT YOUR PRACTICAL SKILLS?

Aware	Frequency	Percentage (%)
Lack of observation and experimentation	50	50%
Lack of in-person interactions	30	30%
Lack of time management skills	13	13%
Lack of motivation	7	7%
TOTAL	100	100%

How did virtual mode of learning affect your practical skills?



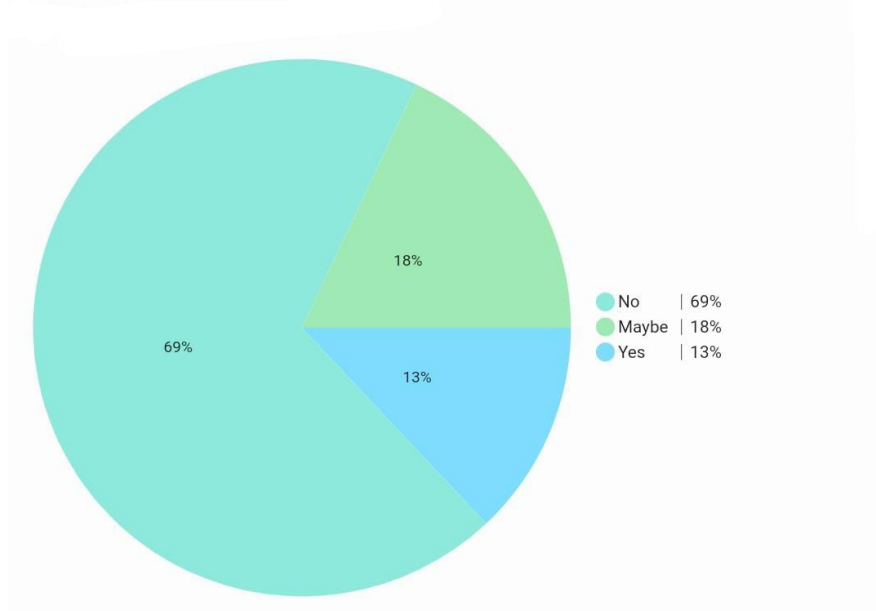
INTERPRETATION:

From the above collected data we came to know that half of the respondents practical skills were affected by Lack of observation and experimentation owing to 50%. Followed by 30% of respondents were affected by the absence of in-person interactions. The next being Lack of time management skills owing to 13% and the least being Lack of motivation owing to 7%.

WERE YOU ABLE TO CARRY OUT THE REQUIRED LAB EXPERIMENTS AND ACTIVITIES DURING THE PANDEMIC?

Aware	Frequencies	Percentage
Yes	13	13%
No	69	69%
Maybe	18	18%
TOTAL	100	100%

Were you able to carry out the required lab experiments and activities during the pandemic?



INTERPRETATION:

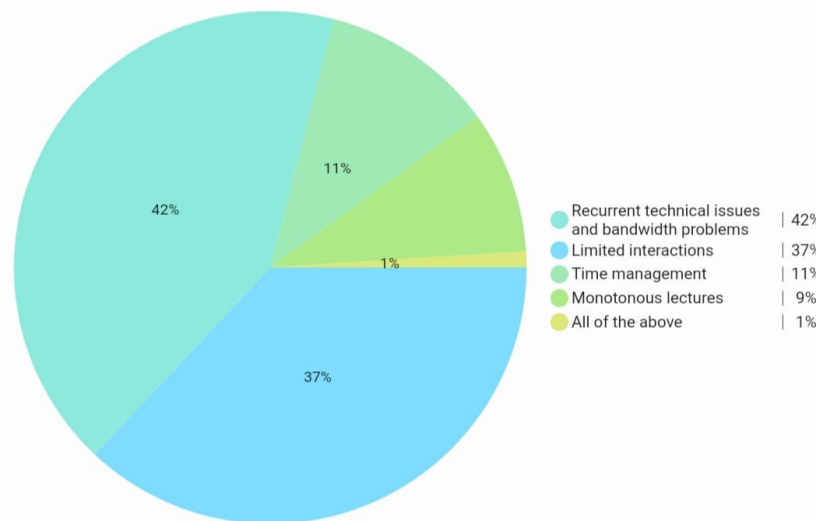
More than half, about 3/4th of the repondents were faced difficulties in carrying out the required lab experiments and activities during the pandemic owing to 69%. 18% of respondents might have been instances where they find it hard to carry out their required lab experiments and activities and 13% proportion of the respondents have not at all felt any problems or issues in their activities.

WHAT WAS THE MOST CHALLENGING ASPECT OF ONLINE LEARNING?

Challenges	Frequencies	Percentage (%)
Recurrent technical issues and bandwidth problems	42	42%
Limited interactions	37	37%
Time management	11	11%
Monotonous lectures	9	9%
All of the above	1	1%
TOTAL	100	100%

What was the most challenging aspect of online learning?

Pie chart | 2023-04-25 13:21:50



INTERPRETATION:

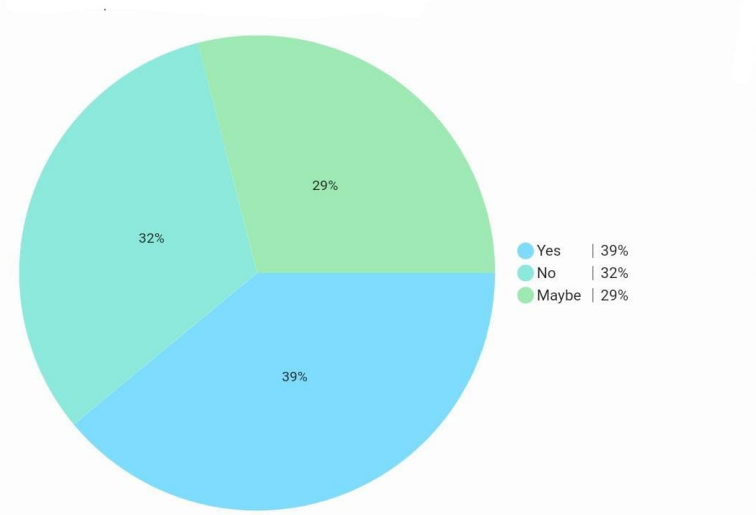
The most challenging aspect of online learning, according to the students are recurrent technical issues and bandwidth problem almost half of the students have faced this certain challenge owing to 42%, making the next challenge- limited interactions owing to 37%. Time management comes third with a percentage of 11%.

Monotonous lectures are the least challenge owing to 9% and the remaining 1% of the respondents have faced all of the above given challenges.

DID YOU FIND IT CHALLENGING TO UNDERSTAND LAB (COMPUTER AND SCIENCE LABS) CONCEPTS WITHOUT HANDS-ON EXPERIENCE?

Challenges	Frequencies	Percentage (%)
Yes	39	39%
No	32	32%
Maybe	29	29%
TOTAL	100	100%

Did you find it challenging to understand lab(computer and science labs) concepts without hands-on experience?

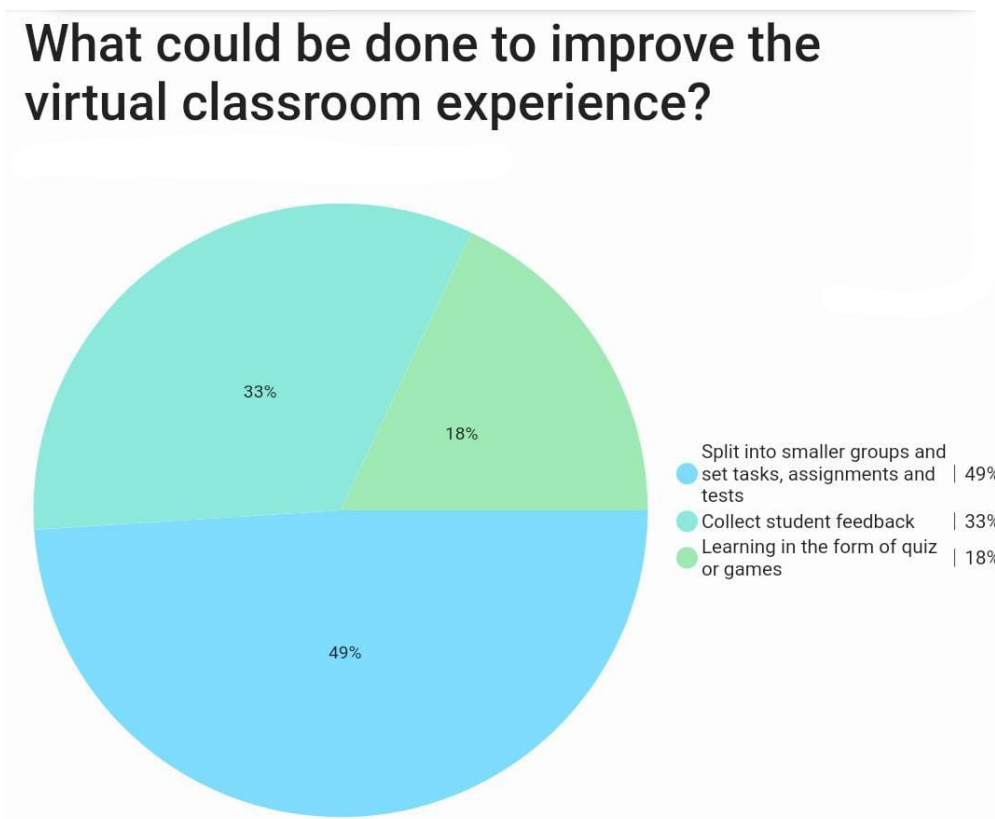


INTERPRETATION:

Most of the students have faced challenges in understanding lab (including computer and science labs) concepts without hands-on experience owing to 39%. Whereas, 32% of the students have not had any problems or issues in understanding it. 29% of the students have circumstances in understanding concepts without hand-on experience.

WHAT COULD BE DONE TO IMPROVE THE VIRTUAL CLASSROOM EXPERIENCE?

Suggestions	Frequencies	Percentage (%)
Split into smaller groups and set tasks, assignments and tests	49	49%
Collect student feedback	33	33%
Learning in the form of quiz or games	18	18%
TOTAL	100	100%



INTERPRETATION:

From the given data we could understand that almost half of the respondents owing to 49% suggests that in order to improve virtual mode of learning experience, it will be great if students are splited into smaller groups and teachers set them small tasks, assignments and tests. Whereas 33% of the respondents suggests to collect student feedback to improve the teaching and learning process in the future times. The remaining 18% of students suggests to learn in the form of quizzes and games which will enhance the process of learning.

CHAPTER-5

FINDINGS AND SUGGESTIONS OF THE STUDY

FINDINGS

Based on our research these are the findings we have gathered:

- From the 100 respondents from the questionnaire we prepared, we came to know that most of the respondents are Female with a total of 66%.
- Most of the respondents were between the age group of 18-21 years, with 83% of the total.
- Many of the students had a negative impact on their ability to learn or study during the Pandemic.
- Most of the students prefer physically attending classes rather than virtual mode of learning.
- Lack of observation and experimentation was the main factor that affect the student's practical skills and knowledge.
- Recurrent technical issues and bandwidth problems were the most challenging aspect of online learning.
- Students were unable to carry out lab experiments and activities during the pandemic.
- Many of the students had challenges in understanding lab (including computer and science labs) concepts without hands-on experience.

- Lack of concentration and experience were the major drawback faced by the student during the pandemic comparing to the pre-pandemic times.
- A majority of the respondents say that there might have been instances where they found it hard for their peers to carry out their virtual classroom sessions during the pandemic.

SUGGESTIONS

The pandemic has presented unique challenges for the education system, particularly in laboratory courses. Here are some suggestions to improve the lab experience in the education system during the pandemic:

Incorporate virtual simulations: Utilize virtual simulations that provide an opportunity for students to engage in hands-on activities without being physically present in the lab. Many companies offer virtual labs and simulations that replicate real-life experiments.

Provide lab kits: Schools can send lab kits to students that contain materials necessary for the experiments. These kits can be mailed to students' homes, or students can pick them up from the school.

Utilize video demonstrations: Record and share videos of the experiments being conducted by the instructor or teaching assistants. This allows students to see the experiment being performed and follow along with the instructions.

Use collaborative online tools: Use collaborative online tools such as Google Docs or Microsoft Teams to allow students to work in groups and communicate with each other. This promotes teamwork and allows students to collaborate virtually.

Encourage independent research: Encourage students to conduct their own independent research on topics related to the lab course. This can be done through online research or by utilizing local resources in the community.

Schedule one-on-one virtual meetings: Schedule virtual one-on-one meetings with the instructor or teaching assistants to address any questions or concerns that students may have.

Modify lab experiments: Modify experiments to make them more suitable for at-home settings. For example, instead of conducting an experiment that requires a Bunsen burner, design an experiment that can be conducted using a hot plate.

CHAPTER-6

CONCLUSION

The COVID-19 pandemic has had a significant impact on the laboratory experience for students and researchers worldwide. Many universities and research institutions had to close their labs or significantly reduce the number of people allowed to access them to prevent the spread of the virus. This closure or reduction in capacity resulted in delays in research, canceled experiments, and a loss of productivity for many labs.

To mitigate the impact of the pandemic on lab experiences, researchers and educators had to innovate and adapt to new ways of conducting experiments and learning. Remote teaching and online courses became the norm, and researchers found ways to collaborate virtually and continue their research from home. New technologies such as virtual and augmented reality also became more prevalent in laboratory settings, allowing students and researchers to simulate experiments and gain hands-on experience in a safe and controlled environment.

Overall, the pandemic has demonstrated the resilience and adaptability of the scientific community in responding to unexpected challenges. However, it has also highlighted the importance of in-person laboratory experiences for students and researchers, and the need to prepare for similar situations in the future.

The COVID-19 pandemic has had a significant impact on the education system, including the laboratory experience for students. The closure or reduction in capacity of labs has disrupted hands-on learning experiences and impacted the quality of education for students. To adapt to these changes, educators and institutions have had to adopt alternative methods of teaching and learning, such as virtual laboratories, simulations, and online coursework. While these tools can provide valuable learning opportunities, they cannot fully replace the benefits of in-person lab experiences, such as the development of critical thinking, problem-solving skills, and the ability to work collaboratively in a lab environment.

Furthermore, the pandemic has highlighted the importance of equitable access to education and resources, as many students do not have access to the technology or infrastructure needed for virtual or remote learning. This has resulted in an unequal impact on students, with some experiencing significant disruption to their education while others have been able to continue their studies with minimal disruption.

In conclusion, the pandemic has had a significant impact on the laboratory experience in the education system, and educators and institutions must continue to innovate and adapt to ensure that students receive a quality education. This includes investing in technologies and infrastructure that can support remote and virtual learning, while also prioritizing in-person lab experiences when it is safe to do so. Additionally, efforts must be made to ensure that all students have equal access to education and resources, regardless of their background or socioeconomic status.

CHAPTER-7

BIBLIOGRAPHY

- Turgut Karakose (“The impact of the COVID-19 epidemic on higher education: Opportunities and implications for policy and practice”) March 2021

- Linda Darling-Hammond and Marie E. Hyler (“Preparing educators for the time of COVID... and beyond”) 4 September 2020

- Utsav Raj and Shivank Khare (“Indian Education System In Fight Against COVID-19 Pandemic”) 11 January 2021

- Warren Kidd and Jean Murray (“The COVID-19 Pandemic and its effects on teacher education in England: how teacher educators moved practicum learning online”) 9 September 2020

- Linor L. Hadar, Oren Ergas, Bracha Alpert and Tamar Ariav (“Rethinking teacher education in a VUCA world: student teachers’ social-emotional competencies during the COVID-19 crisis”) 11 August 2020

- T. Muthuprasad, S. Aiswarya, K.S Aditya and Girish K. Jha (“Students’ perception and preference for online education in India during COVID-19 Pandemic”) 4 January 2021

- Ambika Selvaraj, Radhin Vishnu, Nithin KA, Noel Benson and Arun Jo Mathew (“Effect of Pandemic based online education on teaching and learning system”) September 2021

- Lokanath Mishra, Tushar Gupta and Abha Shree (“Online teaching-learning in higher education during lockdown period of COVID-19 Pandemic”) 10 September 2020

- Gautam Kumar, Gulbir Singh, Vivek Bhatnagar, Rajeev Gupta and Sushil Kumar Upadhyay (“Outcome of Online teaching-learning over traditional education during COVID-19 Pandemic”) September-October 2020
- Malik Mubasher Hassan, Tabasum Mirza and Dr. Mirza Waseem Hussain (“A Critical Review by Teachers on the Online Teaching-Learning During the COVID-19”) 8 October 2020
- Preeti Sheba Hepsiba Darius, Edison Gundabattini and Darius Gnanaraj Solomon (“A Survey on the Effectiveness of Online Teaching- Learning Methods for University and College Students”) 5 April 2021
- Pradip Kumar Das (“Impact of Pandemic COVID-19 on Higher Education-Indian Context”) 16 June 2021
- Mr. LalitKumar Premchandra Patil and Dr. Hires S. Luhar (“An Overview of Indian Higher Education System: During and After COVID-19 Pandemic Period”) 11 April 2021
- Amit Joshi, Muddu Vinay and Preeti Bhaskar (“Online Teaching amidst COVID-19 in India: An Outlook”) 28 November 2020
- Silvia K. Bartolic, David Boud, Jenilyn Agapito, Dominique Verpoorten, Siobhan Williams and Louise Lutze-Mann (“A multi-institutional assesment of changes in higher education teaching and learning in the face of COVID-19”) 9 August 2021

WEBSITES

- <https://www.sciencedirect.com/science/article/pii/S0738059321000973>
- <https://www.mdpi.com/2071-1050/14/19/12812>

CHAPTER-8

APPENDIX

Questionnaire

Gender ^{*}

- Male
- Female
- Other...

Age *

- 13-17
- 18-22
- 23-27
- Or above

What do you prefer, virtual learning or physically attending class? *

- Virtual learning
- Physically attending class

45

Do you think that COVID-19 concerns impact your ability to learn/study? *

- Yes
- No
- Maybe

Do you think your peers were engaged during virtual classroom sessions? *

- Yes
- No
- Maybe

How has your lab experience changed compared pre-pandemic times? *

- Lack of experience
- Lack of concentration
- Lack of instant communication
- Not receiving clear and proper instructions
- Lack of knowledge

46

How did virtual mode of learning affect your practical skills? *

- Lack of observation and experimentation

Were you able to carry out the required lab experiments and activities during the pandemic? *

- Yes
- No
- Maybe

Did you find it challenging to understand lab (computer and science labs) concepts without hands-on experience? *

- Yes
- No
- Maybe

47

If yes, what are the difficulties in understanding concepts without hands-on experience? *

Your answer

What was the most challenging aspect of online learning? *

- Recurrent technical issues and bandwidth problems
- Limited interactions
- Time management
- Monotonous lectures
- All of the above

What could be done to improve the virtual classroom experience? *

- Split into smaller groups and set tasks, assignments and te...
- Collect student feedback
- Learning in the form of quiz or games

What are your ideas and suggestions on physical lab sessions that was disrupted by the pandemic *

Your answer
