The Effect of Integration of Different Online Education Methods on Educational Advancement and Student Development: A Study

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ABSTRACT

Purpose: *The academic year 2020-21 and the first part of 2021-22 have been recognized as the e-learning era. The forced shut down of educational institutions as a result of stringency measures undertaken by the government to contain the COVID-19 pandemic disease, technology-assisted education became an alternative to the existing method. There was a total paradigm shift from conventional methodology to online education. For both students and the teachers, it was a real challenge to get accustomed to this new mode of teaching learning. Different educational institutions used different technologies and methods with the sole objective of imparting quality education to their students. This paper focuses on how well the integration of different online education methods are effective among the students of higher education as the education sector observed unprecedented changes during the outbreak of COVID-19 pandemic. A survey was conducted to investigate the views of students about online education. The responses of students about different methods used for e-learning are collected and the analysis of the   will enable to give some recommendations to the stakeholders of education sector.*

Methodology: *The data essential for analysis is collected using non-probabilistic sampling method. Based on the data collected, some hypotheses were developed to carry out analysis. The technique also addresses issues such as funding and budget limitations. The respondents are the students who are pursuing their higher education. Priority is given to the student of higher education because of their familiarity with the advanced technology, flexibility in adopting new learning platform. The required values were taken out from the original dataset and used to construct sub-datasets to be used for the analysis.*

Findings/Result: *The findings of this study show that students in higher education are satisfied with how education is being delivered in the midst of the pandemic. Educators are using and integrating many types of online education tools as an alternative to traditional methods of instruction, especially in this time of crisis.*

Originality: *This study is an effort to analyze the satisfaction of students about effectiveness of integration of different online education methods at higher educational institutions. The*

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results of this analysis can be useful for the policy makers and other stakeholders of the higher educational level for operative decision-making about measures to be followed for making online education more effective.

Paper Type: *Exploratory research that uses primary data and summarizes it for further analysis. Furthermore, some statistical techniques are applied for the data analysis.*

Keywords: COVID-19, Distance Learning, e-learning, Online Education, Online Education Methods.

1. INTRODUCTION :

Educational institutions ensure a good environment in which students can develop a variety of skills that will be useful in their future careers. Based on their curriculum, students are subjected to a multitude of subjects. They will have many chances to showcase their talents outside of curricular activities. Furthermore, educational institutions offer an environment and opportunities for students to engage with peers. Students learn how to communicate effectively, how to be disciplined, how to be a leader, and so on. Students gain a deeper understanding of concepts, an enhanced desire to learn, and a positive mindset, greater self-confidence as a result of collaborative activities initiated by educational institutions. People used distance learning when they had some sort of difficulty in reaching educational institutions [1]. Distance learning or distance education is not a new concept. It came into existence several decades before the Internet era.

 Originally distance learning intended to cater to the educational needs of students who have the inconvenience to attend regular classes due to geographical limitations or other inconveniences. Distance education was provided by the colleges and universities through the postal service. Students who were enrolled in a particular program used to get printed learning material through the postal service. Students get opportunities to interact with the teachers only through contact programmes organized by educational institutions [2]. Through the use of technology, learning became more interactive and student-friendly. The advancement in technology and the use of the Internet has a huge impact on education. New concepts such as e-learning, remote learning, ubiquitous learning, etc. came into foray after the use of the Internet. With the aid of advanced technology, a variety of thought-provoking learning materials can be developed to make the concepts easily understandable and more interesting. It also increased interactions between teachers and students. The high-tech teaching environment facilitated real-time learning through the integration of various supporting technologies [3]. The Internet has enabled abundant innovations and a huge expansion in the case of online education. Several pedagogical models were invented just to make the learning process effortless and interesting [4].

The majority of institutions of higher education focus on a variety of e-learning activities. Each day there is a surge in the flood of technologies emerging to facilitate the learning needs of the students. During the early days, there was a mixed opinion about e-learning among different stakeholders of higher education. Advancement in technology has contributed substantially to the growth of online learning. Multiple technologies can be blended to provide the students an enriched learning experience [5]. The effectiveness of online education depends upon various issues such as instructor's familiarity with technology, students' view towards online education, tools and technologies used to deliver online education, etc. Though the students are more interested in online education there are technical issues such as the availability of the Internet which act as a deterrent in this process [6].

The outbreak of the COVID-19 pandemic has left no field untouched. The education sector is the one which is highly affected as all schools across the globe remained closed at the end of March 2020. Needless to say, the pandemic has opened new opportunities and innovative technologies for the smooth functioning of the teaching-learning process [7]. Because of the outbreak the educational institutions, teachers, and students were put to test on their readiness to deal with the emergency. The education sector demanded familiarity with advanced technology to enable effective online education. The devastating COVID-19 also has a positive side in which the educational institutions experienced a paradigm shift from traditional methods to technology-enabled ones to facilitate the learning process without any disruption. It has accelerated the use of technology to conduct classes, meetings, assessments, etc. otherwise, they were just definitions in some boos or they might have come into existence a decade later not shortly [8].

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The educational institutions used varied approaches for engaging their students properly in the process of learning. Both teachers and students were expected to be well-equipped so that the teaching-learning process continues uninterruptedly. Webinars, virtual conferences, online meetings, digital study material became part and parcel of the learning process these days. All the stakeholders of the education system came together to bring out the learning software swiftly. Distance learning, online classes, e-learning, remote learning, etc. became buzzwords in the education sector. The policymakers along with other stakeholders took the utmost care to provide the best possible learning content by integrating different media and technologies. Assignments and assessments that are the part and parcel of the learning process were completely transformed into the digital form [9].

An anonymous questionnaire was created and circulated among the students to uncover their views about online learning. Because of the spike in the use of integrated technologies to facilitate online learning, it became essential to analyze its effectiveness among the stakeholders [10]. This study explores the effectiveness of the integration of different education methods on educational advancement from the perspective of students.

2. REVIEW OF LITERATURE :

To relate the current research with others who have already contributed in a similar area a literature review is carried out and the summary of others' findings in the related area is discussed here. In the opinion of Azlan *et al.* [11] awareness, attitude, and training play a crucial role when people have to fight against an unknown disease. It is the people's readiness to accept the changes that are implemented by the authorities to prevent the spread of the disease because misunderstanding, misinterpretation, and lack of awareness are equally dangerous in the situation of the pandemic. It is always better to create awareness among the public about the dos and don'ts. According to Bisht *et al.* [12], the educational sector has observed an unprecedented shutdown that never happened before. Because of the paradigm shift the students and teachers were under a lot of pressure to adapt to the new mode of learning. Students' feedback on online learning will be helpful for the authorities for decision-making.

Shawaqfeh et al [13] conducted an online survey to analyze the preparedness of pharmacy students for online education during the period of the COVID-19 pandemic. Swift focus on online learning created a lot of pressure among the teachers and the students. There were many issues to be addressed such as devices, tools, technology, and connectivity. Institution-wise and student-wise there were many problems to be addressed. When compared to male students, female students are found to be more ready and more prepared for online learning. Using online learning, theory papers can be learned effectively. With live classes and advanced technology, it is also possible to clear doubts immediately. However, learning practical subjects related to health sciences via online mode is found to be a more challenging one.

Demuyakor [14] claimed that when shifting the focus entirely towards the online mode of education, a considerable amount of time is to be spent on planning. Without proper planning, the technique will not be that effective. If sufficient devices are available, tools and technologies are accessible and teachers are trained to use them then only online learning will be more interactive. According to Ma *et al.* [15], the consequences of the COVID-19 are experienced in every aspect of human life. Sudden closure of schools, fear of disease, and anxiety have affected the psychological well-being of children. Children who were at their early age of schooling felt much isolated during online learning.

To make learning more effective, live sessions with a lot of interaction will be more effective. In the point of view of Baticulon *et al.* [16] learning style, rigidness to adopt a new technique, the unsupportive atmosphere at home, additional responsibility at home, poor collaboration, lack of face-to-face interactions is some of the difficulties faced by students during online learning. Rafique *et al.* [17] opined that self-reliance in online learning is much more than just downloading digital learning material and uploading the assignments. A person can troubleshoot some technical issues, performing collaborative activities. When learning via online mode then students will be more self-disciplined, self-motivated, and self-reliant as there is no one to help them nearby during online learning.

Jiang *et al.* [18] suggested that integration of digital technologies will help the students to gain more practical knowledge. When the much-needed hands-on experience is not available to the students of professional courses, it creates stress-related disorders. Hence during online learning more attention should be given to the mental well-being of the students. According to Chaturvedi *et al.* [19] when e-learning was adopted by students of all age groups with different socio-economic backgrounds, there

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were several negative impacts on the students with less-privileged and those who have poor internet connectivity. To avoid the negative impact due to the sudden changes online learning is to be made more interesting and interactive.

The survey conducted by Gohel *et al.* [20] revealed that social media plays a vital role in spreading awareness about COVID-19 among people. Students who pursue health-science-related courses should be aware of the spread of the disease, precautionary measures, etc. as they have greater responsibility more of educating the public.

3. OBJECTIVES :

(1) To explore the various methods for delivering education using an online platform
(2) To investigate the students' satisfaction with the delivery of education through online mode
(3) To comprehend the effectiveness of different technologies used for online education
(4) To compare the synchronous and asynchronous modes of learning

4. HYPOTHESIS :

- H_1: Integration of different online education methods has no positive impact on education promotion and students' progression.
- H_2: There is significant variation in students' perceptions of online education modes concerning types of institutions.
- H_3: There is a significant difference in the acceptance of technology-integrated online education among students.

5. SCOPE OF THE STUDY :

The main goal of this study is to check whether the integration of different online education methods on educational advancement and student development specifically during the period of the COVID-19 pandemic. For this study, the data obtained from an online survey is analyzed. A questionnaire was designed using Google forms and its link was shared using e-mail and WhatsApp. The respondents were given a week to submit their responses. Since it is an online survey, it is not restricted to any geographical area. However, from the data obtained it is clear that most of the respondents were from Karnataka and a few are from Kerala. The study is carried out to obtain an answer to the following questions:

- What is the impact of the integration of different online education methods on education promotion and students' progression?
- Whether the students are satisfied with the way education is delivered through Internet?
- Whether the students have the required technology for online education?
- Which mode among the asynchronous and synchronous online education is prevalent?

The online survey is an effective data collection method that is extensively being followed by many researchers. Nevertheless, this survey is also not free from limitations. Some of the shortcomings of this study are: since all the questions were multiple-choice the options that the respondents wanted might not have been included; since there were more than 50 questions, there are chances that some respondents might have selected some options just for the sake of completion; as there is no mechanism to verify the identity of the respondents, there is a chance of someone else other than the intended respondent might have recorded their views; also there is a possibility that the respondents might not have provided their honest answer.

6. METHODOLOGY :

The effectiveness of the integration of different online education methods in educational advancement according to students' perspectives is studied through an online survey that uses a non-probabilistic sampling method to analyze the data. Based on the data collected, some hypotheses were developed to carry out an analysis. The technique also addresses issues such as funding and budget limitations. The respondents are the students who are pursuing their higher education. Priority is given to the student of higher education because of their familiarity with the advanced technology, flexibility in adopting new learning platforms.

The sample size that was essential for the survey was calculated by taking the help of Statistics Kingdom

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(https://www.statskingdom.com/ 50_ci_sample_size.html). When the confidence is 95% and the marginal error rate is 0.05%, the standard deviation is calculated using the proportion: $\sqrt{(p(1-p))} = 0.50$. Calculates the sample size to get the following confidence interval: 0.5 ± 0.05. $\alpha = 1 - 0.95 = 0.050$. $Z_{(1-\alpha/2)} = Z_{(1-0.050/2)} = Z0_{.975} = 1.96$. The required sample size is: $n = Z^2_{0.975}*p(1-p)/MOE^2 = 1.96^2*0.5(1-0.5)/0.05^2 = 384.15$, which is equal to 385 after rounding off [21-25].

A questionnaire containing 53 questions was created using Google Forms (https://forms.gle/HcyELW1fQjBq1QLM8) and was verified by an Associate Professor in Economics. The questionnaire contained four sections. In section A demographic details of the respondents were asked, B was meant for technology-assisted education, section C contained questions related to students' knowledge and experience and section D was all about questions appraising the exposure and experience. All sections except section A included questions of multiple-choice type. The data acquired this way is used to perform analysis and will be represented in tabular and pictorial form in the subsequent sections. Testing of hypothesis is carried out using the chi-square test model because of its robustness as far as distribution of data is concerned. Lastly, based on the analysis some recommendations and suggestions were given to different stakeholders of the higher education sector.

7. AVAILABLE ONLINE EDUCATION METHODS :

The mode in which interaction happens – in real-time or not in real-time, the teaching-learning is considered as synchronous or asynchronous. The blended learning models include a mixture of both. In the former, the teachers and students interact in a real-time scenario, where teachers deliver lectures at the same time students ask questions and clear their doubts directly in synchronous mode. In contrast, in an asynchronous system, students work at their place and pace through lectures and other learning materials provided. Students ask questions through online discussion forums or other mechanisms and must wait for the teacher to respond [26].

Online education is realized by using a range of synchronous and asynchronous ICCT tools. Some tools such as wiki, blogs, email, chats, etc. are web tools, also called 'social media. Some others such as Google Meet, Zoom, Microsoft Team, Cisco WebEx, Zoom, etc. support face-to-face interactions between the teacher and the students. And a few tools such as Google Classroom, Moodle, etc. create Virtual classrooms mimicking the real classroom. Asynchronous tools are tailor-made for tasks that expect manifestation and more time to fulfill. They are especially used when learners hesitate to collaborate effectively in real-time interactions due to shy nature, lack of language fluency, or socio-religious factors. However, synchronous tools provide an interactive platform for a higher degree of social presence. Here instructors and participants speak, chat, and discuss the subject matter freely without any hesitation in real-time scenarios. Figure-1 given below provides a glimpse of different options available for online education [27].

Fig. 1: Available online education methods.

7.1 Synchronous Methods

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a. Chat

Chat can be used as an online presentation platform for questions and suggestions. Chat can also be used for a specific event. Teachers may create "breakout" sessions with some devices, where small groups of learners hold their meetings. This technique may be used to solve strategic challenges, schedule brainstorms, schedule discussions with pro groups, or create alternate scenario resolutions. Chat sessions have the advantage of following textual dialogue.

b. Instant Messaging

Instant Messaging is one of the most popular web-based applications. It enables two or more users to exchange text messages on a web-based or desktop-based basis in real-time. In an environment commonly called the "Chat Room," a group of people may start a text conversation online. In a conventional conversation, all the messages are seen by everyone. But some chats allow for private messages between two members of the session.

c. Polling

Teachers may ask students to answer the displayed survey which typically includes a question and two or more responses. The facilitator may use the polls to obtain the opinions of students by asking them to vote on questions and choose courses.

d. Screen-sharing/ Online Whiteboard

Instant visual communication is possible via screen sharing/whiteboards. They allow students to view content and teachers to interact. Instructors can use whiteboards when content changes at the last minute and visual components are necessary for synchronous displays. You may also document the presentation. Two-way interaction is allowed by whiteboards. Learners can make annotations on certain parts of the screen, vote visually by showing their choices on a graphic, enter their names and files into the database, etc. A blank canvas that allows teachers and students to collaborate over the internet is known as an online whiteboard. AWW app, Ziteboard, Miro, Limnu, Zoom, Canvas Chrome Application, Groupboard, Conceptboard, etc are a few examples [28].

e. Application sharing

The presenter can share applications, windows, or screens with learners. With authorization from the presenter, the students can monitor the activities of the presenter and control the display. Teachers can teach the software procedure by using application sharing. Application sharing can be used only for shows involving basic movements so that the presentation does not lose smoothness. TeamViewer, Zoom, Chrome Remote Desktop, AnyDesk, Mikogo, ShowMyPC, etc are a few examples.

f. Audio and video conferences

Audio and video conferences are real-time audio and video workshops between two or more users. They are primarily used for meetings and updates of the project. Some applications for instant messaging include video and voice conversations. The applications and services of Voice over Internet Protocol (VoIP) allow users to make high-quality, cheap calls over the Internet. Skype is one of the most popular VoIP apps. Skype offers free calling to its computers and charges a small fee for calls to regular phones to other Skype members. Telephones promise improved audio quality and are more reliable; when people chat more, VoIP is cheaper and faster. Zoom, Jio Meet, Google Meet, Cisco WebEx, Skype, TeamViewer, GoToMeeting, BlueJeans are a few examples.

g. Webcasting

The term webcast refers to sounds and videos sent to multiple passive recipients from a single source. The typical application is a video lecture, in which an expert talk to several students, without contact at the same time. Audio and video are transmitted over the Internet using webcasting streaming media. Asynchronous uses can however be supported with documented webcasts.

h. Online Interactive Presentations

Make teaching and learning more interactive and enjoyable. These tools enable educators to develop and publish interactive e-courses, exams, dialogue simulations, screencasts, and video lectures. They're utilized to do formative assessments, start conversations, and test knowledge with engaging quizzes. Suitable for all levels of education, from primary to higher education. This could be an excellent way to boost classroom participation while also ensuring that everyone's voice is heard. iSpring Suite Max, Nearpod, Prezi, Mentimeter, Visme, etc. are a few examples.

i. Augmented Reality (AR)

Students can effortlessly acquire, process, and remember information thanks to augmented reality. In addition, AR makes learning more engaging and enjoyable. It is also not restricted to a specific age

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group or educational attainment and may be applied to all levels of education, from pre-school to college. Paper textbooks, physical models, posters, and written manuals might all be replaced with augmented reality. It provides learning resources that are both portable and affordable. Education becomes more accessible and portable as a result. AR learning that is interactive and gamified can have a big positive impact on students. It keeps students interested throughout the class and makes learning enjoyable and simple. Teamwork skills are improved through interactive lessons in which all students participate in the learning process at the same time. AR in education aids students in achieving better results by allowing them to see and fully immerse themselves in the subject matter. Accurate recreation of in-field situations can aid in the mastery of practical skills required for a particular profession [28-30].

7.2 Asynchronous Methods

a. E-mail Tools

E-mails are the best way to interact directly and independently between facilitator/educator and student. E-mail is used not for general interest, but for asking and replying to specific questions. If the answer is optional and the subject is not critical, the question should be posted on a forum. E-mails may also be used for responses that can annoy the recipient if they are posted in a public place. Newsletters can be used to send a message to the community or to convey to all participants an alteration or occurrence. Only the teacher can send those messages and not so frequently. For conversation and paper sharing in small groups, mailing lists may be used. They promote project group collaboration and collaborative work [31].

b. Discussion Forums

Discussion forums are the main online debate tool. They enable several participants to talk in the form of posted messages. In other words, at different times participants can communicate with others who can read and answer comments which remain on the forum. One or more discussions may be included in each forum, consisting of one or more comments and responses. Forums are used for thematic discussions, collaborative case studies, posts-class comments, etc. Students and facilitators/teachers can leave messages, read, and answer. The discussion forums can be more appropriate for large groups compared to the mailing lists because participants can freely connect to the learning platform by having discussions jointly rather than by receiving numerous emails. Backchannel Chat, Kialo, Turnitin, YO Teach are some of the examples.

c. Wikis

A wiki is an online editing website. In comparison to traditional web pages that are created offline and uploaded to a web server, wikis are edited "online". To change existing wiki pages or add new pages, users do not need any unique technical expertise. A wiki manager can indicate which site or subsections can be displayed and edited. The administrator can open the wiki for anyone using and editing, or restrict registered users' editing permissions.

d. Blogs

A blog (short of the Weblog) is a resource that enables people to share and access information without needing any computer programming skills and to easily update them. Blogs have been designed to present material, much like a diary, as a simple entry list. A blog allows users to post content in a structured format on a website regularly. The material posted constitutes an analysis or source of ideas that are frequently modified. The central element of a blog is that it gives the blogger a voice (individual or group) and gives those who comment on the secondary voice. Blogs allow information to be shared, accessed, and updated easily. Learners can use them to submit their tasks and to comment on others' tasks. Blogs may also be used as learning logs – a place to reflect, collect ideas and hold smaller conversations. Blogs are a place to "make sense" of what participants learn [32].

e. Podcast

A podcast is an episodic series of spoken word digital audio files that a user can download to a personal device for easy listening. Recorded audio conferences can be made available as podcasts. One or more rotating hosts participating in a conversation on a specific subject or event typically feature a podcast collection. Discussion and content can range from carefully screened to completely improvise in a podcast. Podcasts blend intricate and imaginative sound production with topical topics from scientific research to the news of the slice of life. Most podcast series contain links, displays of guest biographies, transcripts, additional tools, reviews, and even a group forum to discuss the contents of the show. Ardour, Audacity, Easypodcast, PodBean, Podomatic, Google Hangouts on Air are some of the

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examples.

f. Virtual classroom

A virtual classroom is an online learning space for students and instructors to interact. A virtual classroom imitates a classroom run by the traditional instructors by incorporating various kinds of synchronous tools, such as whiteboard, chat, audio conference, or application sharing. While the screen interface can be different, most virtual classroom devices have similar features. Examples are Vedamo, WizIQ, Adobe Connect, Google Classroom, LearnCube, Moodle, BlackBoard Learn, etc.

g. Online Video Channels

If you are prepared first, video sharing is much simpler. Include all your videos in your instructional workshop and organize them around subjects that matter to your training, for example, verticals, case applications, or persona. Students can thus find a video on each video channel that they are interested in. YouTube, Facebook, Yahoo Sites, VEVO, Vimeo, Fullscreen, Comcast, etc. are a few examples.

h. Online Forms

Online Form is an online resource that allows tutors to create forms, surveys, assessments, edit, and exchange forms with other individuals collaboratively. Teachers will use methods to assess their students and calculate current expertise at the start of class. Forms may also be used to provide feedback from students and parents and to receive feedback. Students may also use methods to measure their learning and determine the learning objectives and collect data for their research projects. HubSpot's, Google Forms, Microsoft Forms, SurveyAnyPlace, SurveyMonkey, FormTools, Forminator are a few examples

i. Personal Websites

Teachers can own a personal website and share their knowledge with people who want to learn. Teachers can use a variety of teaching tools available such as forums, videos, articles, live chat, etc. to make the website more interactive. This will not only help students belong to one teacher or one class, instead of available to all who need information.

Augmented Reality

j. Virtual Labs

Laboratory activities play an important role in promoting scientific learning disciplines by allowing students to gain practical skills through experiments and allowing them to gain a deeper comprehension of the material. Virtual laboratory activities can save money, time, and effort, even though laboratory activities are costly and time-consuming. Virtual labs are simulated learning environments that allow students to do laboratory experiments online and investigate concepts and theories without having to visit a physical science lab. Students can test out new lab procedures and have a better understanding of complex lab equipment that might otherwise be unavailable. Students can go into the machinery they are running and understand life science at a molecular level using animations. Alternative access to science education is made possible through virtual lab software. It is a web-based platform that aims to improve learning methods by providing students with a safe and interactive lab environment. It allows students to carry out tests on their own and repeat them as many times as they needed. Learners employ cutting-edge technology to conduct a series of experiments that produce real-world results.

k. e-Portfolio

an ePortfolio (electronic portfolio) is a digital collection of evidence that documents a student's progress in learning over time. Portfolios might be related to certain academic subjects or a student's overall education. Writing samples, images, films, research projects, mentor and peer observations, and/or reflective thinking can all be used as evidence. An ePortfolio is more of a mixture of method and result than a specific software package. A multitude of programs, both PC desktop and internet, can be used to generate presentation portfolios. The electronic portfolio is a collection of a student's work that can help them learn more by allowing them to organize, archive, and showcase their work. Because they allow for asynchronous examination, communication, and feedback, the electronic format allows an educator to evaluate student portfolios as an alternative to paper-based portfolios. Furthermore, students are allowed to reflect on their work, making the e-portfolio experience more relevant. A student's e-portfolio can be shared with a potential employer or used to track the completion of a certain programme or course learning objectives.

l. Online Collaboration Tools

Teaching 21st Century Skills necessitates collaboration. According to studies, students who collaborate improve their problem-solving, creativity, and interpersonal relationship abilities in addition to

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displaying knowledge of the subject matter. Deeper learning occurs when students have dynamic, social, engaging, and student-led learning experiences. The advantages of student collaborative learning are: better student preparation for social and employment circumstances Higher-order thinking, communication, and leadership skills are all improving. Collaboration and synergy between students and instructors, Students' self-esteem and tenacity have improved. A broader understanding from several perspectives When productivity tools and their accompanying data move to the cloud, they open up possibilities for collaboration that aren't possible with desktop apps. Edmodo, Classcraft, Yammer, Padlet, Parlay, Quizlet, Flipgrid, Kahoot, etc. are a few examples.

m. Narrated Presentation with Voiceover

Voice-over PowerPoint, an educator can use to create a visual presentation and then record narration or lecture content in real-time as the slides are being displayed. Individual slides can thankfully be re-recorded without having to start anew. When the slides advance for the spectator in the narration recording, the teacher controls it. Typically, in online courses, the material is transformed into a streaming video that students may watch. The voice-over presentation can also be uploaded online without any effort, and students can access it simply by using its link.

n. Flipped Classroom

In a flipped classroom, students are introduced to a topic at home and then practice working through it at school. This is in contrast to the more frequent practice of teaching new subjects at school and then assigning homework and projects for pupils to finish at home on their own. Face-to-face engagement is combined with individual study–usually via technology–in this blended learning strategy. In a typical Flipped Classroom situation, students might watch pre-recorded videos at home before coming to school with questions and at least some background knowledge to complete homework. While students are initially introduced to new topics outside of the classroom, the flipped classroom consciously switches instruction to a learner-centered approach in which time in the classroom is used to explore topics in greater depth and generate meaningful learning opportunities. 'Content delivery' in a flipped classroom might take many different shapes. Video lessons provided by the teacher or third parties are frequently utilized to convey curriculum, however other options include online collaborative conversations, digital research, and text readings [33-36].

8. DATA ANALYSIS AND INTERPRETATION :

Table 1: Respondents' Profile

Variable	Options	Frequency	Percentage
Gender	Male	516	42
	Female	725	58
	Total	1241	100
Education Level	UG	1018	82
	PG	223	18
	Total	1241	100
Location	Rural	273	22
	Suburban	146	12
	Urban	822	66
	Total	1241	100
Medium of Instruction	English	1215	98
	Kannada	26	2
	Total	1241	100
Institution Type	Aided	210	17
	Government	50	4
	Private	966	78
	Sponsored	15	1
	Total	1241	100

The data essential for the survey are collected using Google form whose link had been circulated among

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the contacts through e-mail and social media. 1241 responses were retained after performing the cleansing process to the data obtained as a response to the Google form.
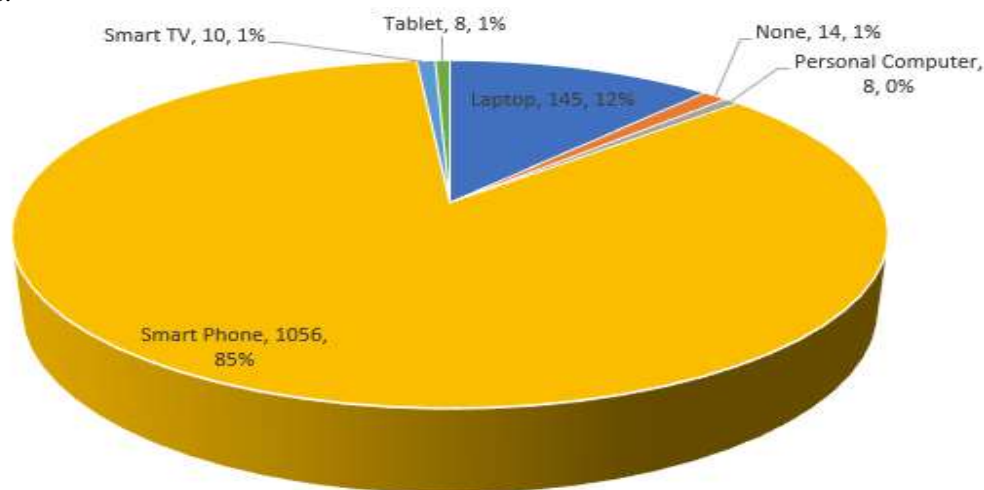
Table-1 shows the respondents' profiles. There are 58% girls and 42% males among the 1241 participants, with the plurality of students pursuing bachelor's education and only 18% pursuing postgraduate courses. When it comes to location, 22% of students are from rural areas, 12% are from suburban areas, and 66% are from metropolitan areas; 98% of them are learning in English medium, while just 2% are learning in Kannada medium. When it comes to the type of institution where they are pursuing their higher education, 17% attend government-aided educational institutions and 4% attend government institutions. At private colleges, the rate is 78%, whereas, in sponsored institutions, the rate is merely 1%. Since the form was sent to the contacts by WhatsApp and e-mail, most of the respondents are from Karnataka, with a few from Kerala and Maharashtra.

The most positive impact on any learning platform is the opinion of students. Ease of use of technology, availability of interactions, etc. is the deciding factors in determining the effectiveness of online education. Table-2 shows students' perception of online education. It shows that they are not feeling it as excellent because only 2.3% of students selected the option excellent; they do not consider as a poor way of learning as it is the opinion of only 5.93% of students; 34.62% of students consider it as a good way of learning whereas 46.52% considers it as an average technique. This shows that students are neither extremely positive about online learning nor negative. In this situation of the COVID-19 pandemic, it can be considered as a way of learning uninterruptedly.

Table 2: Students perception towards online education

Options	Female		Male		Total	
	No.	%	No.	%	No.	%
Excellent	17	2.34	10	1.94	27	2.18
Good	251	34.62	106	20.54	357	28.77
Average	338	46.62	204	39.53	542	43.67
Not interesting	76	10.48	94	18.22	170	13.7
Poor	43	5.93	102	19.77	145	11.68

Smartphones have become an integral part of human life. Youngsters consider it as a means of digital connectivity. A small single gadget is considered a self-sufficient tool to fulfill all the learning needs of the students. They can effectively manage with the new technology to enhance their knowledge. Student of higher education uses their smartphones to access online classes, interact during online classes, answer polls, submit feedback, access digital learning material, etc. This survey provided necessary evidence for the same as shown in Figure-1. 85% of students access their online classes using their smartphones, 12% using laptops, 3% use personal computers, 8.1 percent use tablets, 0.81 % use Smart TVs, 0.64% use the smart TVs and 1.13% of students use some other devices when accessing their online classes.

Fig. 2: Devices prominently used by students for attending online classes,

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The digital device used to access online classes can make learning more effective and enjoyable. Familiarity with tools and technology early improves the effectiveness of learning. The affordability of smart devices has highly penetrated online education. When the students have their gadgets their participation and involvement in online classes increases. They can easily access the technology and manage things more comfortably with personal gadgets as there will not be any 'fear' or constraints on using the gadgets. With personal devices, students have complete access to their devices which will help them to access additional information if necessary. Since the respondents are students of higher education as indicated in Table-3 82.76% have personal gadgets, 14.67% share the device with their family members, 1.77% of students share the devices with their friends and 0.81% of students use the device provided by the institution. Hence the majority of the students can access online education comfortably as they have personal devices. Only 18.2% of students have the hindrance of dependence with family or friends for accessing online education.

Table 3: Students' reactions to the equipment they utilized in terms of self-reliance.

Options	Frequency	%
Own	1027	82.76
Sharing devices of family members	182	14.67
Sharing devices of friends	22	1.77
Sharing devices provided by the Institution	10	0.81

Theoretical knowledge helps one to understand the concept while practical experience gives deeper insights into the subjects based on personal experience. During online classes, it is not possible to handle the equipment from home. Live demonstrations, simulations, virtual labs can help the teachers to conduct practical sessions effectively. Students' opinion on equality of theory and practical experience during online classes is depicted in Figure-3. It mentions that 71.66% of students do not get equal theory and practical experience during online classes while 28.3% of students opined that they get an equal amount of theory and practical experience.

Online learning demands mode self-discipline and self-motivation from the students. However, the effectiveness of online learning depends to a greater extent on the way online classes are delivered to the students. Educational institutions follow different ways such as only sharing the digital learning material such as scanned documents, PDFs, presentations, and digital documents, some conduct live sessions and some institutions follow both live and video classes and some are just sharing the video classes. Table-4 shows the statistics of the way online education is delivered to the students based on the type of institution. Among aided institutions 13.81% just share their digital learning materials, 11.43% conduct live sessions, 1.62% conduct both live as well as video sessions and 57.1% share their video lessons. In Government institutions 2% just share the learning materials, 32% conduct live classes, 28% conduct live classes and upload videos, and 38% of teachers upload video classes. Among the private educational institutions, 9.11% only share the digital learning material, 22.05% conduct live classes, 2.94% conduct live classes and share videos, and 43.89% record the videos and share the same. Among the sponsored institutions 6.6% just share the learning materials, 40% conduct live classes, 33.33% conduct live and video classes, and 20% share the videos. The study reveals that a majority of institutions of higher education upload video classes.

Table 4: Students response to online classes delivery methods

Options	Aided		Government		Private		Sponsored		Total	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Just sharing learning materials	29	13.81	1	2	88	9.11	1	6.67	119	9.59
Live	24	11.43	16	32	213	22.05	6	40	259	20.87
Live and Video Classes	37	17.62	14	28	241	24.95	5	33.33	297	23.93
Video Classes	120	57.14	19	38	424	43.89	3	20	566	45.61

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Grand Total		210	100	50	100	966	100	15	100	1241	100

With the conventional method, there is a lot of scope for interaction between teachers and students. Teachers will be in a position to comprehend whether the topics they discussed are clear to their students by observing their facial expressions. In online learning, there will be limited scope for the teachers to interact with the students. Teachers and students will have to make use of technology for communication after the class. Table 5 shows the way students interact with their teachers to give their feedback and get their doubts clarified. At the undergraduate level, 9.53% of students use e-mail, 35.27% use Google classroom, 16.7% make a phone call, 19.74% use social media and 18.76% of students use text messages to get in touch with their teachers. In the postgraduate category, 9.02 % of students use e-mail, 34.17% use Google classroom, 16.52% phone calls, 20.06% use social media, and 20.23 % use text messages as a means of communication with their teachers.

Table 5: Students feedback about a convenient way to stay in touch with teachers

Options	UG	%	PG	%	Total	%
E-Mail	97	9.53	15	6.73	112	9.02
Google Classroom	359	35.27	65	29.15	424	34.17
Phone Call	170	16.7	35	15.7	205	16.52
Social Media	201	19.74	48	21.52	249	20.06
Text Message	191	18.76	60	26.91	251	20.23

In online learning, instant messaging can be used as a means of communication between teachers and students since face-to-face interaction is not possible. Students can also use it to give their feedback, voice their opinions, mention their difficulties, etc. This type of interaction increases students' satisfaction during online learning and helps to develop a good relationship between teachers and students. When asked about the instant messaging services prominently used for communication between teachers and students as indicated in   Table-6 0.14% of female students responded as Instagram, 0.14% responded as Signal messenger 96.97% responded as WhatsApp and 2.76% responded as other. Among the male students 0.56% use Instagram to communicate with their teachers, 0.4% use Signal, 95.81% use WhatsApp and 3.22% use some other instant messaging. This data shows that WhatsApp is extensively used as a means of communication.

Table 6: Students opinion about the Instant Messaging service the teachers prominently use to communicate

Options	Female	%	Male	%	Total	%
Instagram	1	0.14	6	1.16	7	0.56
Other	20	2.76	20	3.88	40	3.22
Signal	1	0.14	4	0.78	5	0.4
WhatsApp	703	96.97	486	94.19	1189	95.81

Group discussions or 1-1 discussions are considered effective ways of improving the learner-teacher relationship. To collaborate with a group of people for activities such as debating, case study, illustrations, role-playing, etc. group discussion can be conducted. Table-7 shows different options used by teachers to teach their students. In rural areas 51.65% of teachers use Google Meet, 2.93% use Google Duo, 8.06% use WhatsApp Video Call, 1.1% use Skype, 17.95% use others and 18.32% do not use any platform for 1-1 or group discussion with their students. In suburban areas 53.52% of teachers use Google Meet,6.34% use WhatsApp video call, 2.82% of them use Google Duo, 19.72% use some other option, and 17.61 do not use any option for one-to-one or group communication. When it comes to urban areas 54.15% use Google Meet, 5.64% use WhatsApp video call, 3.22% use Google Duo, 0.48% use Skype, 17.89% of teachers use other options and 18.94% do not perform 1-1 or group discussion with their students.

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Table 7: Students view the option used by the teachers for an interactive 1-1 or group discussion

Options	Rural	%	Suburban	%	Urban	%	Total	%
Others	49	17.95	28	19.72	145	17.64	222	17.89
Google Duo	8	2.93	4	2.82	28	3.41	40	3.22
Google Meet	141	51.65	76	53.52	454	55.23	672	54.15
None	50	18.32	25	17.61	157	19.1	235	18.94
Skype	3	1.1	0	0	3	0.36	6	0.48
WhatsApp Video Call	22	8.06	9	6.34	39	4.74	70	5.64

The learning management system (LMS) helps the teachers to design and manage online classes. LMS provides a centralized mechanism to streamline all the learning activities. With LMS teachers can upload digital learning material, assignments, quizzes, etc., and the students can give their feedback, upload their homework. LMS also provides an easy way to assess the students' performance. According to Table-8, 83.56% of teachers use Google Classroom, 1.53% use Moodle, 1.29% use EasyClass, 0.89% use Schoolgy, 7.82% use other LMSs and 4.92% do not use any LMS during online learning. Since Google Classrooms are easy to use and available free of cost they are being extensively used by the teachers.

Table 8: Students response about the Learning Management System (LMS) did the teachers use to set up an online classroom

Options	Frequency	%
Others	97	7.82
EasyClass	16	1.29
Google Classroom	1037	83.56
Moodle	19	1.53
None	61	4.92
Schoolgy	11	0.89

Since face-to-face communication is not possible in online learning, some sort of interaction can be achieved via email. Most of the activities of the learning management system are notified through e-mail only. Instructors can send the information of their weekly assignments, plans for the following week, etc. using email. Despite the availability of texting, instant messaging, and social media, students, and teachers still prefer email as it is regarded as the formal mode of communication. Different email services used by teachers to communicate with their students during online classes are shown in Table-9. 79.69% of teachers use Gmail, 4.83% use institution-specific email service, 0.4% use Yahoo Mail, 0.32 % use Outlook, 7.33% use other email services and 7.41% do not use any email service to communicate with their students.

Table 9: Students' feedback about the email option used to remain in contact with the teachers.

Options	Frequency	%
Gmail	989	79.69
Institution specific	60	4.83
None	92	7.41
Outlook	4	0.32
Yahoo Mail	5	0.4
Others	91	7.33

Videos can help in some ways during online learning. They are considered effective teaching aid, especially in online learning. Besides they can also be used to increase motivation and create a sense of presence. The videos help a lot for the learner who is not in a position to attend live sessions. Table-10

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shows the statistics of different video-sharing platforms used by teachers. 75.66% of teachers upload their videos on YouTube and share their links with the students, 0.04% use Facebook Watch to upload the videos, 0.24% use Yahoo Sites and Vimeo, 16.6% use some other platforms and 6.85% do not use any platform. Since YouTube is a free and easy-to-use platform majority of teachers use it to share their videos. It is easy to create video lessons but to make them more effective, requires substantial planning.

Table 10: Students feedback about the Video sharing platform teachers prominently use?

Options	Frequency	%
Facebook Watch	5	0.4
None	85	6.85
Vimeo	3	0.24
Yahoo Sites	3	0.24
YouTube	939	75.66
Others	206	16.6

Online surveys, feedbacks, and polls are easy, cost-effective, eco-friendly, and efficient ways of collecting information from a set of people. In online learning, teachers use these techniques to conduct quizzes, obtain feedback from their students. Table-11 below shows different techniques used by teachers to obtain feedback or conduct quizzes. 74.05% of teachers use Google forms, 1.61% use Live Survey, 2.9% use Microsoft Forms and 2.9% do not use anything of such kind. This shows the popularity of Google forms. Google forms popular because of their ease of use. One can give a professional touch to their forms by making use of different themes. It is also possible to make someone a collaborator and the forms can perform some sort of data validation. Hence, they are extensively being used as a means of collecting inputs from students.

Table 11: Students opinion about the options teachers prominently use for online forms/surveys/Quizzes

Options	Frequency	%
Google Forms	919	74.05
Live Survey	20	1.61
Microsoft Forms	36	2.9
None	110	8.86
Survey Monkey	7	0.56
Others	149	12.01

Table 11: Students feedback about their preference of education delivery mode

Options	Female	%	Male	%	Total	%
Blended	95	13.1	71	13.76	166	13.38
Classroom	521	71.86	364	70.54	885	71.31
Online	109	15.03	81	15.7	190	15.31

Techniques and activities used to impart education during conventional classroom teaching and those used during online learning may differ. In addition to this, it is based on the mode of delivery of education the teachers design various learning activities to enhance the skills of their students. Table-11 shows the mode of delivery of education preferred by the students. 13.1% of female students prefer blended learning, 71.86% prefer conventional classroom-based learning and 15.03% prefer only online learning. The preferences of male students also are almost similar as 13.38% prefer blended learning, 71.31% prefer classroom learning and only 15.31% prefer to learn online. This indicates the importance

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of conventional classroom learning. Online or blended learning can be used as a means of continuing the education especially in situations such as the outbreak of a pandemic, otherwise, students of higher education are more inclined towards conventional learning.

9. TESTING OF HYPOTHESIS :

Using the Chi-Square Test statistical model, the hypotheses were tested. The chi-squared test (symbolized as X^2) is a data analysis based on random observations of a set of variables. It is typically a comparison of two sets of statistical data. By assuming that the null hypothesis is true, the chi-square test is used to determine how likely the observations are. The formula for chi-square can be written as:

$$\chi^2 = \sum (O - E)^2 / E$$

The observed frequency is denoted by the letter O. E is the null hypothesis' expected frequency, which is calculated as follows:

$$E = \frac{\text{row total} \times \text{column total}}{\text{sample size}}$$

When the null hypothesis is true, the test statistic's sample distribution is known as the chi-squared distribution. The two categorical variables are independent under the Null Hypothesis. Hypothesis testing is a technique for rejecting a null hypothesis with a given level of confidence. The null hypothesis is tested with a p-value of .05 to see if there is evidence against it [36].

In one or more classes or categories, the chi-squared test can be used to see if there is a significant difference between the normal and observed frequencies. It expresses the likelihood of independent variables. Probability is represented by the letter P in this equation. The chi-square test is employed in statistics to compute the p-value [37].

The various p values that correspond to different hypothesis interpretations are given below:

P≤ .05; Hypothesis rejected

P>.05; Hypothesis accepted

The online Chi-Square Test Calculator provided by Social Science Statistics (https://www.socscistatistics. com/ tests/chisquare2/default2.aspx) is used to perform the chi-square test with data samples.

H₁: Integration of different online education methods has no positive impact on education promotion and students' progression.

The observed cell totals, (anticipated cell totals), and [the chi-square statistic for each cell] are all listed in the contingency table (Table-12) below.

Table 12: The contingency table -1

	Female	**Male**	*Row Totals*
Strongly Agree	49 (56.08) [0.89]	47 (39.92) [1.26]	96
Somewhat Agree	422 (369.22) [7.55]	210 (262.78) [10.60]	632
Neither Agree nor Disagree	31 (51.41) [8.10]	57 (36.59) [11.38]	88
Somewhat Disagree	178 (172.34) [0.19]	117 (122.66) [0.26]	295
Strongly Disagree	45 (75.95) [12.61]	85 (54.05) [17.72]	130
Totals	*725*	*516*	*1241*

The calculated chi-square statistic is 70.5618 and the p-value is .00001. Therefore, the result is significant at $p < .05$. Hence the null hypothesis is rejected.

H₂: There is significant variation in students' perceptions of online education modes concerning types of institutions.

The observed cell totals, (anticipated cell totals), and [the chi-square statistic for each cell] are all listed in the contingency table (Table-13) below.

Table 13: The contingency table -2

	Aided	**Govt**	**Private**	**Sponsored**	*Row Totals*
Synchronous	149 (115.91) [9.44]	20 (27.60) [2.09]	512 (533.21) [0.84]	4 (8.28) [2.21]	685

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Asynchronous	61 (94.09) [11.63]	30 (22.40) [2.58]	454 (432.79) [1.04]	11 (6.72) [2.73]	556
Totals	*210*	*50*	*966*	*15*	*1241*

The calculated chi-square statistic is 32.5678 and the p-value is .00001. Therefore, the result is significant at $p < .05$. Hence the null hypothesis is rejected.

H$_3$: There is a significant difference in the acceptance of technology-integrated online education among students.

The observed cell totals, (anticipated cell totals), and [the chi-square statistic for each cell] are all listed in the contingency table (Table-14) below.

Table 14: The contingency table -3

	UG	PG	Row Totals
No. There are a few challenges to be addressed	193 (205.08) [0.71]	57 (44.92) [3.25]	250
Not at all	193 (203.44) [0.54]	55 (44.56) [2.44]	248
Yes	124 (127.15) [0.08]	31 (27.85) [0.36]	155
Yes, but not as much as the conventional method	508 (482.34) [1.37]	80 (105.66) [6.23]	588
Totals	*1018*	*223*	*1241*

The calculated chi-square statistic is 14.9672 and the p-value is .001845. Therefore, the result is significant at $p < .05$. Hence the null hypothesis is rejected [37-38].

10. FINDINGS :

Findings of this survey indicate that using online mode during the difficult situation of the COVID-19 pandemic was the right decision as it was not possible to follow the conventional method. With the closure of educational institutions, students consider that online education is a good idea as it allows them to earn without stepping out of their residence. This learning technique has got challenges such as the availability of network connectivity in rural and suburban areas. Some of the findings of this study include

- Students do not believe that online education is a substitute for traditional classroom-based education, but in this epidemic condition, they believe it is the best alternative for keeping the face of education advancement.
- The majority of students use their smartphones when accessing online classes. When students use personal devices, they have greater control over the device and will be more comfortable learning, also, they need not have to wait for the availability of the device to access online classes. Hence the availability of devices to access online classes is not at all an issue.
- The majority of students receive online education through personal devices.
- Students believe that online education did not give them enough practical and theoretical experience.
- Teachers in online education do not prefer synchronous delivery methods, such as live classes.
- To keep in touch with their teachers, students use a variety of methods. They believe that Google Classroom is the greatest approach to communicate with teachers when compared to other options.
- WhatsApp is the most popular tool for students to communicate with their teachers. This option is used by a massive 96% of students to communicate with their teachers.
- Students believe that many of their teachers use Google Meet for establishing one-on-one or small-group discussions. This method is used by more than half of teachers.
- To construct a virtual classroom environment, most educators use Google Classroom as their preferred Learning Management System. 84% of teachers are using Google Classroom.
- The majority of teachers prefer to deliver online education using Google resources such as Gmail, YouTube, Google Forms, Google Classroom, Google Meet, and others.

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- The students' views on physical classroom-based traditional education are straightforward. They consider it to be the most effective mode of teaching when compared to the online and mixed-mode of learning.

11. RECOMMENDATIONS :

Technology has become an integral part of students' lives. Teachers integrate different technologies to make the learning process more interesting. Adequate use of technology can empower the younger generation to a large extent and make them think out of the box. Integration of different technologies has revolutionized the learning process. It enhances the learning outcome and improves effectiveness. When the learning process is more interactive students become more creative instead of being just passive listeners. Integration of technology can provide deeper knowledge when participating in online learning. Interactions, feedback, and collaborative activities make online learning more powerful. With the aid of technologies, the roles and responsibilities of teachers and students have changed these days. Teachers are playing the role of facilitators and the students are solely responsible for their learning outcomes. To make the online learning process more effective the teachers should know the use of the right technology at the right place.

- Extensive use of technology, as well as time spent in front of computers and operating devices, has been connected to health issues such as stress, back pain, shoulder pain, etc. Therefore, online learning and all the associated activities should be limited to 3-4 hours per day. The main aim of any education system is to enhance the knowledge and skills of learners. Both theory and practical subjects are to be given equal importance. Students believe that online education provides them with insufficient practical and theoretical experience, so educators are encouraged to use virtual platforms such as virtual classrooms, virtual labs, simulators, and virtual libraries to bridge the learning gap.
- When familiar and user-friendly technologies are used students would be able to cope better with education rather than technical hurdles. In this context, it is suggested that educational institutions make full use of free and open-source online resources to provide more effective and interactive online education.
- It is tremendously good for students' social skills and classroom behavior management to encourage them to communicate their feelings. Students begin to recognize and comprehend their own emotions, which can aid in the development of their autonomous thinking.
- Teachers must provide additional possibilities for students to express themselves in virtual classrooms in this regard. To realize that conducting online classes for small groups of students rather than a big audience is encouraged. Encourage children to voice their feelings is extremely beneficial to their social skills and classroom behavior monitoring. Students learn to notice and understand their own emotions, which can help them develop independent thinking. In this regard, teachers must provide additional opportunities for pupils to express themselves in virtual classrooms. It's important to recognize that teaching online classes to small groups of students rather than a big team is beneficial.
- Students believe that online education offers limited opportunities to learn than on-campus education. To overcome this, teachers must make extensive use of a variety of educational resources and deliver learning materials in both online and offline modes, ensuring that students receive as much input as possible to meet their learning objectives. Teachers should also be punctual enough to provide the learning material after every session, weekly or chapter-wise.
- Teachers may be unfamiliar with preparing digital content and effectively communicating it online. It's unrealistic to expect them to improve and pupils to adjust overnight. In this regard, adequate training and orientation programs for both teachers and students are required to adjust to the online environment without undue stress or discomfort.
- To accomplish face-to-face and interactive education, it is advised that synchronous means of education delivery over the internet be used, such as live classes using live meeting applications.
- The internet connection, speed, reliability, and availability are among the most significant barriers to the effective continuation of online education. In this regard, the authorities must examine the existing situation and rectify the difficulties so that students and teachers have constant and stable internet access wherever they are.

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12. CONCLUSION :

During this difficult situation of the COVID-19 pandemic, online education is the only way to impart education without any break. With the aid of advanced technology students are expected to learn from home. Teachers and the management of educational institutions are continuously exploring new ways, new possibilities, and new avenues to make the learning process more interactive, more interesting, and more effective. Online learning allows students to learn beyond the curriculum. This mode of learning is not free from challenges. Interrupted power supply, weak or non-existent network connectivity are some of the factors that act as hindrances to online education. During this tough situation of the COVID-19 pandemic, online education has emerged as an effective methodology. Integration of technologies has a considerable role to play in the success of online learning during the COVID-19 pandemic. However, it cannot be considered as an effective alternative to the conventional education system because of the technical slags and lack of practical exposure. Above all online learning demands good concentration, self-discipline, and self-motivation. There are several barriers to online learning. When these barriers are identified and resolved online learning will become more effective and enjoyable especially when it is the only possible mode of learning during an unequaled situation such as the outbreak of the pandemic.

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