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## Message from the Editor-in-Chief

### Hello from TOJDEL

The Turkish Online Journal of Distance Education & E-learning AECT, Governors State University, Sakarya University, Ohio University and other international universities will organize International Distance education Conference and International Educational Technology Conference (IETC & IDEC-2021) in September, 2021 at International Final University ([www.iet-c.net](http://www.iet-c.net)). IDEC series is an international educational activity for academics, teachers and educators. This conference is now a well-known distance education event. It promotes the development and dissemination of theoretical knowledge, conceptual research, and professional knowledge through conference activities. Its focus is to create and disseminate knowledge about distance education and e-learning.

TOJDEL is interested in academic articles on the issues of distance education. The articles should talk about distance education. These articles will help researchers to increase the quality of both theory and practice in the field of distance education.

I am always honored to be the editor in chief of TOJDEL. Many persons gave their valuable contributions for this issue.

### Call for Papers

TOJDEL invites article contributions. Submitted articles should be about all aspects of distance education and e-learning. The articles should also discuss the perspectives of students, teachers, school administrators and communities.

The articles should be original, unpublished, and not in consideration for publication elsewhere at the time of submission to TOJDEL.

For any suggestions and comments on the international online journal TOJDEL, please do not hesitate to fill out the [comments & suggestion form](#).

**April 01, 2021**

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## A COMPARATIVE STUDY OF E-LEARNING PLATFORMS AND ASSOCIATED ONLINE ACTIVITIES

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### ABSTRACT

E-learning provides an opportunity of skill development and knowledge gain from anywhere, anytime and anyplace. Schools and higher education institutes are facing closures due to the spread of the COVID-19. During this period a noticeable impact is observed in take up of digital learning by students and professionals. Now a day there is variety in e-learning platforms. These platforms can be a mobile apps, video conferencing apps or LMS software. The purpose of this research is to study various activities performed in e-learning environment. This paper will present the comparative analysis of widely adopted e-learning platforms. This study would be beneficial for educationalist while adopting an online learning platform.

**Keywords:** E-learning platforms, LMS, Video Conferencing, online learning activities

### INTRODUCTION

E-learning, a term defined by Jay Cross in 1998, founder of the Internet Time Group, became prevalent. (Cross,2004, pp.103-110). E-learning is defined as ‘Learning modules which can be accessed by individuals by internet enabled devices.’ It is also referred as ‘the use of technology to deliver learning and training programs’ (E-learning portal, 2009). Online educational courses enable learners to log on and move through menu based choices anytime, anywhere at their own pace and leisure (Wisset, 2006, pp.269-277). Social learning, employability and entrepreneurship are some of the major dimensions of continuous learning. Multi-device offering and offline touch will provide more responsiveness amongst the learners. E-learning platform is advantageous in terms of enhanced learning, cost effectiveness, flexibility in timing, uniform quality of content delivery, re-usability of the content etc. In addition to that it places no age limit for the learner (KPMG 2017).

Platform is a software or hardware on which other applications could be developed and executed. The widely adopted platforms for e-learning are web based, mobile based and desktop based. E-learning platform allow learners to access online resources and information to support educational delivery and management. In 2020, emergence of video conferencing applications, dedicated dynamic content websites and evolution of internet leads to better opportunities in electronic communication and access and transfer of educational resources (Kirti Punia, 2013). Learners have started adopting language learning apps or online flashcards, schools are using online classroom services and professionals have different online certifications and degree programs etc.

The quality of an e-learning course is affected by the factors like student’s engagement and training, content, granularity, interactivity, personalization etc. Open ECBCheck is an accreditation and quality improvement system for e-learning program that supports organizations to measure the success and permits continuous improvement through peer collaboration. (Ehlers, 2009)

### RELATED WORK

Mohammed Ouadoudet al.(2016) used software engineering and pedagogical engineering approach to evaluate the quality of platforms used for e-learning. The analysis is based on the characteristics like usability, functional suitability, compatibility, portability etc. The paper has presented a comparative analysis of four freely available e-learning platforms in qualitative approach. Study was aimed to measure the degree of competence between technology and the pedagogy. The objective was to present this study as a recommendation system for selected free e-learning platforms.

Gopal Sakarkaret al.(2012) article has provided comparative study of various architectures of e-learning platforms. This study has focused on research challenges and design issues in improvement of intelligent e-learning architecture system in providing online classrooms. Authors have suggested to use Semantic Web technology and intelligent software agents for learner’s personalization in e-learning.

Păduraru Monica, Elisabeta, Mihăilă, Robert Alexandru (2018) compared 5 popular e-learning platforms present in the market. The comparison is done on the basis of user's profile, price, free trials, platforms used, facilities offered, technical and documentation support etc.

Adekunle I. Obasa et al.(2013) studied MOODLE as asynchronous platform while the Elluminate is synchronous platform for e-learning. This study involves the comparative analysis of online learning system platforms.

Yılmaz S., Erol İ.E (2019) presented a comparative content analysis of popular platforms preferred by universities in Turkey. The study as carried out to examine how online education is transformed into a more effective structure with the help of developing technologies. This study has determined that Augmented Reality and Virtual Reality make significant contributions to the instructor control, interaction and the experiential learning.

### ACTIVITIES IN E-LEARNING

E-Learning platforms allow instructors to coordinate their work, focus on learners and receive constant feedback from them. Designing of regular student activities are significant for student’s engagement and to keep them on task. Gamification increases the student engagement and knowledge acquisition by incorporating fun, rewards, collaboration and competition in various activities.

Activities carried out at e-learning platforms can be categorized as Synchronous and Asynchronous activities. Synchronous activities take place in real time when people from both sides are present at a given time. Video and audio conferencing, online chatting, white boarding, application sharing and instant messaging are some the examples of synchronous activities. Self-paced courses, forums, blogs, messaging, streaming audio and video, sending e-mail etc. are asynchronous activities which are time-independent (Bailie, 2009).

In e-learning environment student assessment can be done through online quizzes, tests, postings in bulletin-board, projects, participation in chat/discussion forum, proctored tests etc. (Beaudin,2016) The table below, illustrates types of Online learning activities and Learning Outcomes based on Bloom’s Taxonomy (Mirriahi,2020).

Table 1. Online learning activities and Learning Outcomes

Type of Learning Outcomes	Tasks	E-Learning activity
Remembering	defining, identifying, recognizing, listing, naming, retrieving	Online self-test, online search, Flash cards
Understanding	Summarizing, comprehends, explaining, categorizing	Blogging, Tweeting, Tagging, Discussion Forum
Applying	Implementing, operating, using, editing, solving	Simulations, Virtual labs
Analyzing	Organizing, Outlining, integrating, comparing, validating	Polling, annotating videos
Evaluating	Testing, experimenting, checking, judging, moderating, critiquing	Blog critics, online debates, virtual labs, peer review
Creating	Compiling, Designing, publishing, developing, producing, inventing, constructing	Podcasts, video casts, Presentations, Digital storytelling

### LEARNING MANAGEMENT SYSTEM

Learning content can be delivered and managed through LMS software framework. As per the definition given by OVAREP, ‘the e-learning platform is a computing device that groups several tools and ensures the educational

lines'. LMS solutions provide vigorous reporting and tracking capabilities, assessment, assignment features and online access to learning material. Learners could share their experience through social platforms. Some popular and widely used LMS are considered here for comparative analysis:

Table 2. Comparative Analysis of LMS

	<b>Moodle</b>	<b>TalentLMS</b>	<b>Chamilo</b>	<b>Google Classroom</b>	<b>LMS365</b>
<b>Customers</b>	Academic Freelancers, Non Profits, Public Administrations	Large Enterprises, Non Profits, Small/Medium Businesses	Academic Freelancers Large Enterprises , Non Profits, Small/ Medium Businesses	eLearning professionals and online educators facilitators, content creators, Large Enterprises, Small /Medium Business	Small/Medium Businesses, Large Enterprises, Non Profits Public Administrations
<b>Deployment</b>	Mobile Application, Self-Hosted Cloud-based	Mobile Application, Cloud services	Mobile Application, Self-Hosted Cloud-based	Mobile app or web based, Cloud based system	Cloud services
<b>Supported Platforms</b>	Windows, Linux, Mac	Windows, Linux, Mac	Windows, Linux, Mac	Windows, Android, iPhone/iPad, Mac, Web based, Mobile	Windows, Android, iPhone/iPad, Mac, Web based
<b>Supported Browsers</b>	Chrome, Internet Explorer, Firefox, Safari	Chrome, Internet Explorer, Firefox, Safari,	Chrome, Internet Explorer, Firefox, Safari	Google Chrome	Safari, chrome, Internet Explorer, Firefox
<b>Activity Grading options</b>	Maintain Course History, Gradebook, Multiple grading scales Manual Grading	Course History, Manual Grading	Maintain Course History, Gradebook, Gradebook , Manual Grading. Multiple grading scales	Gradebook beta, customize Grading system, grade categories, transfer grades	Grades for Assignments, Custom Grades ,SCORM/AICC packages
<b>User Authentication</b>	Manual Accounts, Self-Registration with Admin verification	Active Directory /LDAP Integration, Manual Accounts, SAML2/API Integration Self-Registration	Active Directory/LDAP Integration, Manual Accounts, SAML2/API Integration, Self-Registration	One sign-in-with G Suite for Education accounts. permissions setting for users, G Suite for Education	Azure Active Directory and authentication, supports multi-factor and SMTP authentication
<b>Course Categories</b>	Assign Courses to categories, Create and Manage Categories	Assign Courses to categories, Create and Manage Categories	Assign Courses to categories, Create and Manage Categories	posts across classes and archives	catalog of courses and training plans for users
<b>Course Creation</b>	Assignments Built-In, Authoring Tool, backup, Survey, Tests Engine	assignments, Built-in Authoring Tool, reusing material, backup, LIVE events, Survey Engine	Assignments Engine, Built-in Authoring tools, reusing material, backup Options, curriculum	Create class discussion, manage discussion, Sharing of links, videos, and images	Creating and managing courses, Class Notebook, assignments, quizzes, certificates to learners
<b>Course Formats available</b>	Format Learner, Topics	Format Learner video conferencing webinar, Format Topics	Format Learner Videoconferencing / Webinar, Format Topics	Gamification Real time feedback, class discussions, video conferencing	Gamification, video conferencing
<b>Gamification</b>	Plugins for Gamification	Badge customization, Gamification, Leader boards Levels, Points , Rewards	Badge customization, Gamification, mechanics Leaderboards Points, Rewards	badges, levels, achievements, and game points to the classroom	Recognition and rewards, leaderboards
<b>Interface Options</b>	Calendar, Location setting, Media embedding Multilanguage Support, Ready-made Themes	Calendar, Location Settings, Media embedding, Multilanguage, Ready-made Themes	Multilanguage Support, Media embedding settings, Ready-made Themes	Manage multiple classes, Co-teaching of course, Enrich assignments, SIS integration, Ready-made Themes	In Person, Live Online, Webinars, Documentation

<b>Learning Types</b>	Blended learning,, Asynchronous Self-paced , Synchronous Virtual Classroom	Blended Learning,, Asynchronous, Self-paced Synchronous Virtual Classroom	Blended Learning, Asynchronous Self-paced, Synchronous Virtual Classroom	Asynchronous led, Synchronous, Virtual Classroom	Asynchronous, Blended learning, Course authoring, SCORM Compliance Synchronous Learning, Video Conferencing
<b>Security</b>	IP Blocker Anti-spam Anti-virus	IP Blocker domains restriction, Anti-spam, Anti-virus Strong Passwords	IP Blocker, domain restriction, Anti-spam Anti-virus, Strong Passwords	Classroom is covered under the core G Suite for Education Terms of Service	Utilizes data encryption, single sign-on and two-factor authentication
<b>User enrollment</b>	Attendance Tracking, Guest Access , Self-enrollment	Attendance Tracking, Guest Access, Self-enrollment	Attendance Tracking, Guest Access, Self-enrollment	Enrollment through e-mail invite, share class code, usage trends and monitor Classroom user activity as G Suite admin	Attendance Tracking with QR code or via mobile app

LMS are available either as commercial or opensource solution for the users. Choice of LMS is dependent on the user requirements and ease of use. Main features like consolidation of e-content; tracking student activities and support for web or virtual classroom highly impacts adoption of LMS.

### EDUCATIONAL APPS

Students and instructors can interact through video conferencing applications, learning management systems, chat applications, e-mails etc. Teachers could hold classes online. Video conferencing has turn out to be most reliable for people to connect from anywhere in real-time regardless of family & other work commitment (Verbrughe,2020).

Table 3. Comparative Analysis of Video Conferencing apps

<b>Zoom</b>	<b>Google Meet</b>	<b>Microsoft Team</b>	<b>Cisco Webex</b>
Freemium	Free	Freemium	Freemium
Free up to 100 users	Free	5,00,000 per organization	Free up to 100 users
App required	App not required	App not required	App not required
Screen sharing & co-annotation	Recordings (in cloud), file and screen sharing	Recordings (in cloud), file and screen sharing	Recordings, file and screen sharing
Meeting participants can be grouped in breakout rooms for small group discussions	Integration with G Suite	Integration with Office365	Pre assign Breakout Session Participants, multimedia, applications & file sharing
TLS encryption, Zoom service itself can access the unencrypted content of Zoom meetings	'in transit' encryption of messages, video meeting links available only to business people.	Encrypts data 'in transit'. Secured datacenter networks for storage and use Secure Real-time Transport Protocol (SRTP) for audio, video, desktop sharing.	encryption for data in transit and at rest, flexible password management, role based access, robust data center security

Some more popular apps include Khan Academy which provides videos, articles and problem-solving sets for the students. Duolingo is gamified learning app which acts as a comprehensive online language learning platform. Byju's app is highly popular among students with focus on mathematics and science. CameraFi Live is an Android app for live streaming of high-quality videos on YouTube, Twitch, and Facebook. It supports diverse camera connection and real-time video editing features. OBS studio is widely used open source software for live streaming and video recording. NIIT, Coursera, Udemy, Unacademy are some popular online education providers.

## INDIAN ONLINE EDUCATIONAL PLATFORMS

In order to provide better education facilities schools have started investing in information and multimedia technologies. Educomp has offered supplementary online solutions for educational institutions to open up novel ways of learning. Dish TV is providing educational channels of MHRD. Virtual labs motivate students to conduct experiments remotely in order to understand the subjects like science and mathematics better (Times Now Digital, 2020). Some of the digital platforms of MHRD for education delivery are DIKSHA, National Repository of Open Educational Resources (NROER), e-PATHSHALA, SWAYAM and SWAYAMPURABHA. Some more initiatives include AICTE Training and Learning (ATAL), MOOCS, ShodhShuddhi, Shodhganga, VIDWAN etc. According to Times New Digital (April 2020) news in India HRD Ministry's free online learning platforms were highly utilized during lockdown period. SWAYAM courses have observed rise of about 2.5 lakh strikes as compared to the former 50,000 strikes in the last week of March 2020 (IBEF, 2020).

ePathshala is a joint initiative developed by MHRD, Govt. of India and NCERT. The purpose is to disseminate e-resources like textbooks, audio, video, periodicals, for students, teachers, parents, researchers and educators. It also enables participation in exhibitions, contests, workshops, etc. ePathshala mobile app is available on Android, iOS and Windows platforms. DEEKSHA mobile app has been effective since September 2017 for enhancing teaching and learning processes. It offers teachers, students and parents engaging learning material pertinent to the prescribed school curriculum. AICTE has launched the Enhancement in Learning with Improvement in Skills (ELIS) portal to encourage online learning and support student community across the country (Ghosh, 2020).

## CONCLUSION

Digital transformation has highly impacted today's education sector. Leading educational institutes have started developing apps and launching channels on YouTube for providing online programs to their students. This lockdown period has provided an opportunity and the right time to strengthen e-learning content to leverage its potential for learners and educators. Recent technological advancements like virtual/augmented reality, big data, artificial intelligence, cloud computing and gamification has brought revolution in the field of e-learning. Online certifications and up skilling are the major goals of online learning. This study has focused on popular and widely used e-learning platforms in the market. Currently available diversified online platforms were considered for this study. Various features and activities performed by learners and instructors during online learning were identified, analyzed and compared. It is observed that desktop client, mobile app and web clients in video conferencing applications are offering different features. Limited features and access controls are provided in web client and mobile apps in terms of sharing screen, video, recording and support of multi-tenancy etc. If user is unaware of this fact it may become tedious to use. In present scenario academic institutes are in need of secured software that integrates LMS with video conferencing and live streaming facilities.

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## AN INVESTIGATION INTO HIGHER SECONDARY SCHOOL STUDENTS' ATTITUDE TOWARDS ONLINE CLASS DURING COVID-19 PANDEMIC SITUATION

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### ABSTRACT

The entire world is battling against the COVID-19 pandemic situation. Work from home is the talk of the day and has become the norm in most of the industry. To reduce the spread of COVID-19, most countries around the world have decided to temporarily close in-person instruction and moved to remote learning and teaching from March 2020 onwards. However, the educational sector takes concerted efforts to maintain learning continuity during this period. Students have to rely more on their resources to continue learning remotely through the Internet, television, or radio. Teachers also adopt new pedagogical concepts and modes of delivery of teaching, for which they may not have been trained. Likewise, the learners in the most marginalized groups, who don't have access to digital learning resources or lack the resilience and engagement to learn on their own, are at risk of falling behind. The problems like poor attendance, lack of personal touch, and lack of interaction due to connectivity issues were not only faced by the faculty members but also by the students. It increases the stress level among the young generation and increases the negative attitude towards the education system. The present article highlighted the Higher Secondary School Students' attitude towards online classes.

### INTRODUCTION

The main core of education is to learn. Learning could be a method of feat data or skills through study, expertise, or being educated. Any freak accident that happens within the world can continuously leave its impact on education. The COVID-19 has affected people regardless of gender, caste, education, nationality, or income. It affects every industry or sector as well as every activity of Individuals. Education is not exempted from this. Moreover, the education sector is the worst affected sector than any other sector during the pandemic situation. The COVID-19 lockdowns interrupted the traditional schooling system. It also leads to many inadequacies and inequities in our education systems. It requires access to broadband and computers for online education, and the supportive environments required to focus on learning. The misalignment between resources and needs leads to nationwide school closures in most countries. Students from affluent backgrounds could find their way to alternative learning possibilities past closed school doors. Those from disadvantaged backgrounds often remained shutout when their schools shutdown. Governments around the world are making efforts to facilitate the continuity of education for all using different digital modes of learning. According to a survey report of the Ministry of Human Resource Development (MHRD), Government of India, there are 993 universities, 39931 Colleges, and 10725 standalone institutions listed on their portal, which contribute to education (DNS Kumar, 2020). Even though the country has been adapting to the new-age learning, but they still lie an obstacle in achieving entire success as only 45 crore people of our Internet/e-learning access is open to the entire population of the world. People living in rural areas are also seriously deprived of technology, hampering the root cause of online education. On the other hand, the switch over from offline to online learning negatively affects the students, who have higher difficulties in adapting to the new learning environment. Similarly, most of the students' communities are not having relevant learning digital resources (e.g. laptop/computer, broadband internet connection), home learning



environment (e.g. a quiet place to study or their desk) support from their parents. All these factors make the students to hopeless in their education and it will affect their future growth and aim.

### **STATEMENT OF THE PROBLEM**

The closures of the educational sector due to the COVID-19 pandemic situation have led to an unprecedented impact on education. According to UNESCO, since the outbreak of COVID-19 began, 1.37 billion students in 138 countries worldwide have been affected by school and university closures. The classroom is no longer home to almost 60.2 million school teachers and university lecturers. It leads by online seminars, teleconferencing, digital open books, online assessments, and participation in virtual worlds to the digital revolution in the education system. Both the students and teachers are facing many problems in the virtual teaching-learning process. Before the pandemic situation, online teaching was not a major form of education in schools. So most of the teachers have no or minimal experience in online teaching. Likewise in conventional classroom teaching the students and lecturers have face-to-face interaction. It increases socialization. Social issues like students' involvement in group work, helping each other to perform assignments, and looking at the facial gestures of lecturers when explaining a point are instrumental to facilitate learning in the conventional classroom. These things are very low in an online learning situation. Problems in assessing course material, absence of socialization, and not possible to interact with the course teachers and friends are increasing the stress level of the students.

### **SCOPE OF THE STUDY**

Due to the rapid spread of COVID-19 across the country, schools have shut their doors. The classes have moved online mode to slow the spread. The transition to virtual learning has impacted not only teachers but also the students who have had to adjust to anew learning environment. One of the major consequences of the transition to e-learning is an impact on student health. Virtual learning has also inevitably increased the number of time students spends on digital devices every day. Online learning has also impacted students' patterns of physical exercise. Due to e-learning walking between classes or between homes to school has dramatically reduced and some students stationary for hours on end in front of their computers. It also reduces the social interaction among the students. Due to that students are not only physically depressed but also mentally affected by stress. Therefore it needs to study the students' attitude towards online education.

### **REVIEW OF LITERATURE**

R.Radha, et all, in their research pinpointed that the online method of learning is best suited for everyone. Many individuals want to train at a suitable moment, based on their availability and comfort. This encourages the learner to view information modified anytime they want it. He also pointed out that E-learning has become quite popular among students across the world particularly, during the lockdown period due to the COVID-19 pandemic.

Emmanuel Aboagye et all revealed that accessibility is the most important challenge students are facing in a complete online learning situation although all the other challenges reported higher means. Again, the study further revealed that students were not prepared for a complete online experience while social issues and lecturer issues affect students' intentions to study online. Before adopting e-learning, an organization should consider the business environment, technology, content, training procedure, culture, human resources, and financial considerations.

Pravat Kumar Jena, in his article, pointed out that, the outbreak of COVID has worked as a catalyst for educational institutions to grow platforms with technologies, which have not been used before. Because of the current option of digital channels, students who are not fortunate as others will struggle. But universities and the government of India are relentlessly trying to come up with a solution to resolve this problem. The priority should be to utilize digital technology to create an advantageous position for millions of young students in India.

## OBJECTIVES OF THE STUDY

The main objectives of this study are:

1. To analyse the demographic profile of the students.
2. To identify the positive factors towards the online classes.
3. To find out the problems faced by the students in their online learning.
4. To understand the students' expectations in online classes.
5. To give suggestions to increase awareness about social insurance schemes.

## RESEARCH DESIGN AND METHODOLOGY

In view of considerable data from survey research as well as secondary sources collected and presented in this research report, 'descriptive research' is considered the most appropriate for the present study. The analysis suggestions emerge from the data attained from the sample survey of Virudhunagar District respondents.

A total of 250 respondents were selected by the researcher from 154 higher secondary schools in Virudhunagar District. An online survey technique was used to gather data about the higher secondary school students' attitudes towards online classes. The questionnaire was designed with the help of a literature survey and informal discussions with the students who are currently attending the online classes.

The secondary data were collected from published documents, leading journals, magazines, newspapers, standard textbooks of related topics, and sources from the internet.

## RESULT AND DISCUSSION

### DEMOGRAPHIC CLASSIFICATION OF RESPONDENTS

Demography profile can be defined as "the study of the composition of a social entity in terms of its members' attributes" (Pfeffer 1983)<sup>(5)</sup>. Student's perception towards online education differs from gender, a group selected residential area, etc.

The inquiry about demographic classification describes that among 250 higher secondary students 57.6 percent of the respondents are boys students, 64 percent of the students are studying in matriculation schools, 54.4 percent of the respondents are belonging to an arts group, 59.2 percent of the students are living in an urban area, 36.8 percent of the students' family members are earning between Rs.15,001 and Rs.20,000. These particulars are portrayed in the following table 1.1.

**TABLE 1.1**  
**DEMOGRAPHIC CLASSIFICATION**

Demographic Factors	No of Respondents	Percentage
<b>GENDER WISE CLASSIFICATION</b>		
Boys	144	57.6
Girls	106	42.4
<b>NATURE OF SCHOOL</b>		
Government School	36	14.4
Aided School	54	21.6
Private/ Matriculation School	160	64.0
<b>GROUP SELECTED</b>		
Arts Group	136	54.4
Science Group	114	45.6
<b>RESIDENTIAL AREA</b>		
Rural	102	40.8
Urban	148	59.2
<b>MONTHLY FAMILY INCOME</b>		
Below Rs.15,000	84	33.6
Rs.15,001 to Rs.20,000	92	36.8

Rs.20,001 to Rs.25,000	42	16.8
Above Rs.25,000	32	12.8
Total	250	100

Source: Primary Data

### GADGET USED

The technological revolution leads to a major impact on contemporary education. Technological changes play a major role in all new pedagogical skills in education at all levels. Digital devices are not only used for entertainment but also make more opportunities for the students in engaging learning activities especially during the COVID 19 pandemic situation. The researcher gathered the information about the device used by the students to access the online classes.

The survey reveals that, out of 250 respondents, 62 percent of the students' preferred mobile phones for e-learning, followed by 21.2 percent of the respondents are using the Laptop for e-learning and the remaining 16.8 percent of them are accessing the online class by using the mobile phone as well as the laptop. This information is depicted in table 1.2.

**TABLE 1.2**  
**GADGET USED**

Gadget	No of Respondents	Percentage
Mobile Phone	155	62.0
Laptop	53	21.2
Both Mobile phone and Laptop	42	16.8
Total	250	100

Source: Primary Data

Table 1.2 reveals that the majority (62%) of respondents are using mobile phones for their online education.

### TIME SPENT FOR ONLINE EDUCATION

During the COVID 19 situation, teachers are getting more confident with the new ways of teaching and students are getting used to screen-learning. The Ministry of Human Resource Development (MHRD) has recommended a time limit for the online classes as no more than two sessions per day for students in classes 1 to 8, and no more than four in classes 9 to 12 for pupils, each session lasting a period of 45 minutes. To find out the number of hours the students attend the online classes the survey was made. It reveals that, among 250 students, 7.2 percent of them are attending the 2 hours per day, followed by 16.8 percent of the informants are listening 2 to 3 hours per day, 50.8 percent of the informants are spending 3 to 4 hours and the remaining 25.2 percent of the students are attending the online classes for more than 4 hours per day. This information is depicted in table 1.3.

**TABLE 1.3**  
**TIME SPENT ON ONLINE CLASSES**

Time Spent	No of Respondents	Percentage
2 and less than 2 Hours	18	7.2
2 – 3 Hours	42	16.8
3 – 4 Hours	127	50.8
More than 4 Hours	63	25.2
Total	250	100

Source: Primary Data

The above table 1.3 makes it obvious that 50.8 percent of the students are attending online classes between 3 and 4 hours per day.

### FACTORS INSPIRING TOWARDS ONLINE EDUCATION

In this pandemic situation, there is no way for teaching in the classroom. All educational institutions are forwarded to the e-learning environment. E-learning helps the students to learn the subject at their comfort and requirement. The survey reveals that out of 250 respondents 26.8 percent of the informants felt that the online classes help them to know the latest technology, followed by 22.4 percent of the students' self-learning process are increased due to online classes, 33.2 percent of the students have identified the online mode of attending classes as the alternative way for accessing the material, 11.6 percent of the students feel that online classes are more comfortable than the traditional schooling system and the remaining 6 percent of the students opined that the online classes save their time. It has been brought to the forefront in table.1.4.

**TABLE 1.4**  
**FACTORS INSPIRING TO LEARN THROUGH ONLINE**

Inspiring Factors	No of Respondents	Percentage
Help me to know the latest technology	67	26.8
Increase the self-learning process	56	22.4
Identify the alternative way to access material	83	33.2
Feel comfortable at home than at school	29	11.6
Save the time	15	6.0
Total	250	100

Source: Primary Data

From the analysis of the above table, it is understood that online classes help nearly one-third (33.2%) of the students to identify the alternative way to access their study material.

### STUDENTS' EXPECTATIONS

E-learning poses a challenge to both teachers and students over technology and access, but it is keeping everyone busy with worksheets, video lectures, and assignments. The researcher gathered information about the students' expectations to carry out the online classes effectively and efficiently. The study reveals that, among 250 respondents, 20.4 percent of the students expect that the online class should be an interactive session, followed by 34.4 percent of the informants who expects the multimedia presentation, 16.8 percent of the students required the simplified study material, 14.4 percent of the students are pointed out that, the classes should be taken in vernacular language and the remaining 14 percent of the informants expected that the demonstrating the subject must be as it's in the traditional class. The result of the study has been expressed in the following table 1.5.

**TABLE 1.5**  
**STUDENTS' EXPECTATIONS**

Expectations	No of Respondents	Percentage
Interactive session	51	20.4
Multimedia Techniques	86	34.4
Simplified study material	42	16.8
Explanation in vernacular languages	36	14.4
Demonstration	35	14.0
Total	250	100.0

Source: Primary Data

Table 1.5 has brought to light that, more than one-third (34.4 percent) of the students are expecting a multimedia presentation.

### HYPOTHESIS: 1

- Ho: There is no significant association between gender and students' expectation towards online education.
- H1: There is a significant association between gender and students' expectation towards online education.

To test the above Hypothesis, the researcher used the Chi-square Test. The result has been displayed in table.1.6.

**TABLE 1.6.**  
**GENDER AND STUDENTS' EXPECTATION TOWARDS ONLINE EDUCATION**

Factor	Chi-Square Value	Significant	Accept/Reject Ho
Gender and students' expectation towards online education.	30.130	.000	Rejected

Source: Computed Data

Since the P-value is less than 0.05, the null hypothesis is rejected at a 5% level of significance. Hence, the researcher concluded that there is a significant association between gender and students' expectation towards online education.

### PROBLEMS IN ACCESSING ONLINE CLASS

The interviewer gathered the information about the problems faced by the students in accessing the online classes. All the respondents were asked to rank the problems in order of magnitude. Each respondent was instructed to indicate the most important reason by assigning rank 1, rank 2 to the next reason, and so on for the difficulties faced by the students in their online education. By using Henry Garret Ranking Technique the total score and mean score was calculated and presented in the following table.

**TABLE 1.7**  
**PROBLEMS FACED BY RESPONDENTS**

Problems	Total Score	Garrett mean Score	Rank
Network problem	7670	34.09	1
Unpleasant Environment	7587	33.72	2
Screening Problems	7389	32.84	3
Lack of support from the parents	7112	31.61	4
Voice clarity	6555	29.14	5
Electric/ Charging Problems	6554	29.13	6
Health Problems	6489	28.84	7

Source: Primary Data

The above table reveals that for accessing the online, class the students require the quality and uninterrupted network; the network problems adversely affect the students' education and their concentration power and is ranked as 1<sup>st</sup> rank, and its total score and the mean score were 7670 and 34.09 respectively. A pleasant and supporting environment is necessary for education. The students do not effectively attend the class due to the absence of a supportive environment and it has scored as 2<sup>nd</sup> rank, where the total score is 7587 and the mean score is 33.72.

### PROBLEMS IN ONLINE LEARNING

Learning is a process of increasing the skills, acquiring knowledge, and helps in the improvement of their career opportunities. There's no chance of educating in the classroom in this pandemic environment. All educational institutions are forwarded to the e-learning environment. In the classroom teaching the students and staff members have face-to-face interaction, helping each other to perform assignments, and looking at the facial gestures of teachers when explaining a point are instrumental to facilitate learning in the conventional classroom. But it is not

possible in online learning. Therefore the interviewer gathered the information about the problems faced by the students during their online education time. Using the Friedman test the attitude of the respondents is estimated and converted into mean rank and the result has been displayed in table.1.8.

**TABLE 1.8**  
**PROBLEMS IN ONLINE LEARNING**

Problems	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree		Friedman Mean Rank
	N	%	N	%	N	%	N	%	N	%	
Difficult to access the material	21	8.4	32	12.8	86	34.4	63	25.2	48	19.2	2.38
Not possible to clear doubts satisfactorily	84	33.6	72	28.8	36	14.4	31	12.4	27	10.8	3.85
Absence of practical explanations	76	30.4	69	27.6	54	21.6	30	12	21	8.4	3.21
Not using updated ICT tools	24	9.6	32	12.8	51	20.4	67	26.8	76	30.4	2.46
No review on the previous class	36	14.4	43	17.2	52	20.8	61	24.4	58	23.2	2.33
Rush up the syllabus	91	36.4	65	26	53	21.2	27	10.8	14	5.6	3.97

Source: Primary Data

It is inferred from the recap of problems of students in online learning that, “Rush up the syllabus” is the main problem faced by the students in their online class with Friedman's mean rank of 3.97. It implies that compare with conventional classes, the number of teaching hours in an online class is low; therefore the staff members are concentrating only on the syllabus and try to complete the syllabus in a limited time. But the students are not able to follow their staff members. Followed by “Not possible to ask doubt" with Friedman's mean rank of 3.97. It implies that in conventional class the students frequently interact and asked their doubt their teachers but it's not possible in the online class. Therefore they are unable to ask their doubt and clarify the same.

### SUGGESTIONS

1. The online classes are required to identify, use the latest technology, and alternative way to access the online material. Therefore the staff members help the students to access and operate the latest technology.
2. The staff members should increase their ICT technology to deliver their subject effectively and efficiently.
3. To attract and inspire the students the staff members must use multimedia technology.
4. The teachers are concentrating on rushing up the syllabus. Instead, the staff members should practically explain their subject.
5. The staff members must allow the students to ask their doubts and frequently ask the questions to identify whether the students properly listen to the class as well as to verify whether they understand the topic or not
6. Like a conventional class, the faculty members review the previous class before starting the session.

### CONCLUSION

The disruption in learning caused by COVID-19 is unprecedented. The adoption of online classes is the only way to ensure the continuity of education following the physical closure of schools. The switch over from offline to online learning caused by COVID-19 is likely to affect negatively also. Online education is not only new to the students but also to many of the teachers. The success of online education depends on the teachers. Therefore teachers themselves must increase their knowledge of ICT. Online education also increases the self-learning concepts and technological knowledge among the students. To make the online class more effective the staff members use multimedia technology. Moreover, instead of time-bound rushing up the syllabus the practical demonstration, clarifying the students’ doubt and frequent interaction with the students make the online class more pragmatic and effective.

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## ASSESSMENT OF FACTORS AFFECTING ADOPTION OF ONLINE EDUCATION

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### ABSTRACT:

COVID – 2019 pandemic has changed the educational scenario and forced to develop abrupt changes in the areas of education in India. Majority of the educational institutions have to adopt online education for the benefits of students learning and internal assessments. The developing country like India where still the classroom teaching is the most favourable medium of education and online education is in the childhood stage. Due to the availability of infrastructure, mindset of various stakeholders, it is the biggest challenge for various stakeholders to switch from traditional teaching to online education. This study tries to identify factors affecting online education among faculty members and college students. Two online studies (N= 500 students and N = 250 faculty members) have been carried out with the help of structured questionnaires. Exploratory factor analysis and Confirmatory factor analysis were used to identify the factors; Infrastructure & Technology dimensions, students' related dimensions, faculty's related dimensions, facilitating dimensions, social influence dimensions, effort dimensions, perceived usefulness, performance expectations dimensions and security & risk dimensions. The study discusses the practical implications of these findings.

**Keywords:** Online education, dimensions related to online education, faculty, student

### INTRODUCTION:

Lockdowns to contain spread of the COVID-19 pandemic have posed many challenges for the education sector globally, and India is no exception. Lock down seized the education institutions across the world and over one and a half billion learners stuck at home that is an estimation of representing 90% of world's student's population, observed in March 2020. Across all countries schools, institutes, colleges & various universities are shifting their teaching virtually. There is huge demand in different types of online educational courses. KPMG and Google assumed that the E learning market in India could reach over \$2 bn in 2021. As COVID-19 pandemic, the actual figure might be double or more than that. Gradually Universities belonging to India have tried to follow the foot-steps of UK, US and UNESCO models of online education. It is estimated that 80 percent of India's population uses their mobile for accessing the internet for learning that is conversion of classroom teaching to online education, conducting classes, assignments, quizzes, assessment, grading, course credit and even degree also. There is a severe need for more technology enabled educational institutions that put in place a proper plan-of-action for millennial generation students, teachers as well as ensuring academic development in the use of technology. Apex bodies like AICTE and UGC and HEIs open platforms of online learning to students through SWAYAM, MOOCs, NPTEL, NDL and so on.

### LITERATURE REVIEW:

In the education sector and allied studies, the terms such as "online education/learning", "Internet based education/learning", "E - education/learning", "I – education/learning", "Web based education/learning", "Web based instruction", "Education/learning portal", "Distributed learning", "Distance learning", "Online courses", "mobile learning", have been used simultaneously. Despite the availability of various terminologies, the "online education" is starting to be considered the most popular and widely used method during this pandemic (Kaplan & Leiserson, 2000; Khan, 2005; Masrom, 2007; Taha, 2014). Literature contains a wide range of definitions related to online education. Xaymoungkhoun, Bhauasiri (2012) defined online education as "a novel and innovative approach of delivering contents via electronic forms which enhances learners' knowledge, skill and performance. Mbarek & Zaddem (2013) defined online education as "learning and educational instructions supported by various ICT systems to gain a wide range of information as well as knowledge which is delivered through various online modes. Kaplan & Leiserson (2000) defined online education as "delivery of message and content with the help of internet and various electronic devices such as audio, video, satellite broadcast, mobile, laptops, desktops, tablets interactive television, and so on. Okiki (2011) defined online education as "the use of different hardware, software and network technologies to create, foster, deliver and facilitate learning any time, any condition and any place in the world". According to Malik (2010), Xaymoungkhoun, Bhauasiri (2012), and Odunaike, Olugbara (2013), it is the emerging medium of conveying information in the various sectors of education. Online learning becomes an integral part of the modern day education in various vocational, distance learning and teacher trainings (Bourne et al., 2005). The purpose of this study was in multi-direction by looking at factors which are affecting adoption of



online education. In the present study, researchers want to identify various dimensions which affect students and faculty members towards online education during COVID 19 pandemic in India. Kraidy, (2002) studied, the students are innovators in adopting the digital media in their learning in present & all the future studies. The term flexible learning has a broad meaning across educational institutions. However, flexible learning based on the vigorous participation from the students in various learning activities (Nikolova & Collis, 1998, Rockwell, S.K., Schauer, J., Fritz, S.M., & Marx, D.B. 1999) and extensive ways of learning could be motivated (Gendron & Teyssier, 2009). The model proposed by Peltier, Drago, and Schibrowsky (2003) was focused on “student-to-student interactions, student-to-instructor interactions, instructor support and mentoring, information delivery technology, course content, and course structure.” Willingness of all the stakeholders for online learning is foremost important for successful implementation of online education (Arbaugh et al., 2009).

Selim (2007) identified that student, faculty/teacher, ICT enabled technology and organizational support is the most critical dimensions for success and failure of online education. According to Frimpon (2012) role of student, faculty, information technology are important for the success of online education. Sun, Ray (2008) identified faculty members, ICT technology, curriculum and environmental factors which affect the online education. Mosakhani and Jamporzmei (2010) identified critical success factors for e learning which are; faculty characteristics, student characteristics, quality of topics discussed, ICT quality, interaction among people, support of organization and techniques of managing knowledge. Pituch & Lee (2006) identified that technology is the important factor for effectiveness of any online education. Masoumi (2006) identified that college and management support play an important role in enhancing awareness of online education. Schroeder (2003) identified that as students pay a heavy amount of fees they require infrastructure facilities from colleges which includes availability of technology supporting online education, which includes internet connectivity, bandwidth, data transfer speed, computer, and smart phone and so on. Students were the centre of the research, by looking of progressive learning. Researchers were trying to identify learning of students online. Andersson, Annika. (2008) identified that interaction, easy availability, confidence; problem solving approach, flexibility and attitude are the key factors in success of online education. In 1989, Davis and his associates introduced TAM (Technology Acceptance Model) for development of effective framework to understand acceptance and usage intentions towards various technologies. O’Cass & Fenech (2003) concluded that when Internet users have enough knowledge about the various computer and ICT enabled technology then it boosts the belief towards understanding the E learning concepts. Further concept of Self-motivation towards online education indicates identifying a behavioural aspect towards reaching a goal (Zimmerman, 1985, 1994). During the lockdown period due to COVID-19 pandemic, it is essential to adopt self study concepts for completion of the online course of their respective curriculum.

Faculty is the core part for implementation and success of various online programs related to education. Teachers’ satisfaction is the important factor for measuring the effectiveness as well assessment of any program (Salter, G. 2003). It is believed among the faculty members that students will be actively participating in online education and will communicate every portion of information with the involvement in learning with the respective course instructors (Doris U. Bolliger & Oksana Wasilik, 2009). Faculty involvement plays an important role in making the environment better during online sessions (Ali & Smith, 2015). For HEIs (Higher Education Institutes), practical implications during digital literacy efforts as well as teachers’ training are key factors to evaluate the adoption of various ICT based learning technologies (Tom Buchanan, Phillip Sainter, and Gunter Saunders, 2013). However in context of motivating faculty, several research study related to online education, especially distance education found the motivating factors which influence the teachers to participate and barriers which stop the teachers to adopt the ICT enabled learning (Bower, 2001; Durette, 2000; Fredericksen et al., 2000; Hartman et al., 2000; Palloff & Pratt, 2001; Panda & Mishra, 2007; Kim, K., Liu, S. and Bonk, C.J. 2005). As the online education becomes the main stream of providing education, faculty satisfaction must be measured with consideration of adoption rates, expectations of students, support of management, availability of various ICT enabled technologies (ADEC, n.d.; Betts, 1998; Fredericksen et al., 2000; Hartman et al., 2000; Sloan Consortium, 2006; Panda & Mishra, 2007; Simonson et al., 2009, Ute Kraidy, 2002).

There are some other dimensions that were taken into consideration in this research. Those were facilitating, social influence, effort, perceived usefulness, performance expectations, and security & risk. Kaynama & Keesling (2000) found that established ICT enabled technological learning enhance subject expertise. Higher organizational support, management support, information center support will generate more favorable attitudes about the system among students. Students have to be more cautious in online learning compared to traditional learning. For effectiveness of online learning various types of learning tools and techniques as well as self involvement are the

main things. Self motivation is the biggest factor in success of online education (Smith, 2001). Learner's perception of MOOCs are affected by factors like skill of student/learner, availability, affordability and usability (Sanjay Mohapatra, Rituparna Mohan, 2016) in addition of these virtual learning experience is the biggest factor which affect students' experience towards process and outcomes of online education. Usefulness of e-learning was mentioned in research of (Davis, 1989), he also concluded that whenever positive or highly favourable perception towards usefulness of online education is created, it automatically leads to enhancement of job performance.

With consideration of available literature related to factors affecting online education, there is a shortage of studies related to this with respect to India and also lacks any proper framework which measures the success of online education or factors affecting adoption of online education. Despite the lack of relevant literature in India, previous studies found common problems and issues related to online education adoption and its various settings.

#### **RESEARCH OBJECTIVES:**

Online education is becoming the trending trend in the education sector in the pandemic. Till now the growth of online education was mostly seen in developed countries and most of the studies also have been done in developed countries as well as those universities which adopted online mode of education. India has seen an upward trend in online education due to pandemic. Majority of the studies focused on attitude, intention and behaviour towards online education. Considering the geographical coverage of India, there are no comprehensive studies that measure the factors which affect online education.

Therefore, the present study focuses on identification of factors which affect adoption of online education among students and faculty members of various colleges/institutions in India.

#### **RESEARCH DESIGN & METHOD:**

For the present study following research design and methods have been adopted. The present study follows single cross section descriptive research design with the help of online primary survey research method.

#### **Measures of the constructs:**

For the present study, standardized scales as well as constructs are not available in literature. Researchers have developed statements related to online education based on the available reviews, discussion, and some past studies related to online education and e learning. The authors have taken help of studies done by Jovic, M., Neskovic, E., Kostic Stankovic, M., (2017); Chamber and Clarke's, (1987); Jones and Clarke's, (1994); Drambot, Watkins-Matek, Silling, Marshall, & Garver, (1985); Loyd & Gressard, (1984); Knowles & Kerkman, (2007); Robinson & Doverspike, (2006); Yudko, Hirokawa, & Chi, (2008) and Chavda, V.N. & Parmar, B.J. (2020)..

To make reliable and validate the questionnaire, researcher has done pilot study on 25 students as well as faculty members. Based on the responses of pilot study, statements of questionnaire have been revised and final survey has been carried out.

#### **Data collection procedure:**

A structured questionnaire developed with the help of Likert Scale for carrying out the survey. Students as well as faculty members from various institutes of Gujarat who have experience towards online education constituted the population for the present study. The respondents were identified by contacting the authorities of various institutes.

Two online surveys have been carried out. First online survey has been done on 500 students and second online survey has been done on 250 faculty members with the help of non probability convenience sampling method. Out of the 500 student responses, 447 valid responses were used for the analysis, while all 250 valid responses of faculty members are considered for analysis. To check the reliability of the instrument, Cronbach's alpha was utilized also descriptive statistics; factor analysis and confirmatory factor analysis were applied on collected primary data with the help of SPSS and AMOS software.

**5 RESULTS AND DISCUSSION:**

**DEMOGRAPHIC PROFILE OF STUDENTS & FACULTY MEMBERS:**

**Table 1: Demographic profile of students (Source: Primary Survey)**

Demographic Profile	Items	Frequency	Percentage
Gender	Male	282	63
	Female	165	37
Age (In Years)	15 - 20	49	11
	21 - 25	313	70
	Above 25	85	19
Education	Graduate	246	55
	Post Graduate	201	45
Monthly Family Income (Rs.)	Up to 15000	94	21
	15001 - 35000	175	39
	35001 - 55000	111	25
	Above 55000	67	15
Possession of Desktop/Laptop	Yes	291	65
	No	156	35
Availability of Internet connectivity at home	Yes	241	54
	No	206	46

The above table 1 identifies the demographic characteristics of respondents. Out of 447 respondents, only 291 respondents have desktop or laptop and 241 respondents have internet broadband connection available at home.

**Table 2: Demographic profile of Faculty member (Source: Primary Survey)**

Demographic Profile	Items	Frequency	Percentage
Gender	Male	175	70
	Female	75	30
Age (In Years)	25 - 35	55	22
	35 - 45	157	63
	More than 45	38	15
Education	Post Graduate	200	80
	Ph D	50	20
Teaching Experience (In Years)	Less than 5	28	11
	5 - 10 Years	180	72
	More than 10	42	17
Designation	Lecturer	12	5
	Assistant Professor	135	54
	Associate Professor	68	27
	Professor	35	14
Teaching Level	Only in Graduate	37	15
	Only in Postgraduate	50	20
	Both	163	65
Possession of Desktop/Laptop	Yes	250	100
Availability of Internet connectivity at home	Yes	250	100

The above table 2 identifies demographic characteristics of faculty respondents. Out of 250 respondents, all respondents have desktop or laptop and have internet broadband connection available at home. Majority of the faculty members have teaching experience more than 5 years and are teaching at graduate and postgraduate levels.

**EXPLORATORY FACTOR ANALYSIS:**

Exploratory factor analysis is carried out on the 41 items of online education for students and 45 items of online education for faculty members using principal component and varimax rotation. Using exploratory factor analysis, those items whose Eigenvalue greater than and equals to 1 was retained. Communality represents the proportion of variance an item shares with other items, so with this consideration those items whose communalities above 0.6 are considered for the analysis. The result condensed deleted items and later they were clubbed under different independent factors. The value of Kaiser-Meyer-Olkin (KMO) measures samples is appropriate as well as adequate for factor analysis or not. KMO (Kaiser-Meyer-Olkin) values are 0.877 and 0.899 for students and faculty members respectively which is well above the threshold of 0.60 (Kaiser, 1974). Bartlett’s Test of Sphericity shows the strength of relationship among variables is strong or not. In present study, Bartlett’s Test of Sphericity was found to be significant at 0.000 (Bartlett, 1954). Exploratory factor analysis provided nine factors which have Eigen value more than 1, and items together explained 63.34% of variance in students and similarly, nine factors which have Eigenvalue greater than one, and items together explained 72.29% of variance in faculty members. As seen from the analysis of students and faculty members, no factor loading is less than 0.60, suggesting that there are no cross loadings and each item has only one component associated with it. To check reliability of scale items, Cronbach’s alpha is calculated. Nunnally (1978) states that whenever correlation value between items is greater than 0.4, then accept the result.

**Result of Exploratory factor analysis of students:**

**Table 3: Final output of exploratory factor analysis (students)**

Factor	Acronym	Scale Items	Cronbach Alpha	Communalities	Factor Loadings	Eigen Value
Infrastructure and Technology Dimensions	IT1	Low internet bandwidth	0.763	0.688	0.779	5.634
	IT2	Inadequate training programs		0.683	.769	
	IT3	Lack of technical support		0.727	.731	
	IT4	Lack of ICT infrastructure		0.679	.702	
Student's related Dimension:	SD1	Lack of enough motivation	0.849	0.636	.743	3.693
	SD2	Lack of enough knowledge		0.723	.739	
	SD3	Lack of English language proficiency		0.804	.788	
	SD4	Lack of ICT skills to operate system		0.671	.703	
Faculty's related Dimension	FD1	Lack of compatibility	0.792	0.615	.633	2.691
	FD2	Challenge related to Teaching method & Lecture content quality		0.663	.726	
	FD3	Lecture content quality		0.674	.679	
	FD4	Lack of control over students engagement		0.669	0.669	
Facilitating Dimensions	FACD1	Course structure is well defined	0.824	0.654	.635	1.829
	FACD2	Reusable learning objects (materials, lectures, etc.,)		0.748	.601	
	FACD3	Institutions should provide necessary help and resources		0.810	.677	
	FACD4	Conveyance course framework		0.813	.627	
	FACD5	Training & manuals are easily available		0.627	.623	

Social Influence Dimensions	SID1	It is the need of this hour	0.845	0.726	.771	1.656
	SID2	Management understands the strategic advantage		0.781	.786	
	SID3	It will give recognition among social network		0.666	.633	
Effort Dimensions	ED1	System operating will be very easy	0.704	0.732	.728	1.563
	ED2	Less efforts to understand online system		0.901	.813	
	ED3	It will be easily accepted		0.779	.723	
Perceived usefulness	PUD1	Online education content is not informative	0.629	0.753	.632	1.444
	PUD2	It will not increase academic productivity		0.819	.776	
	PUD3	It will not help me to get a better job		0.823	.818	
	PUD4	It will not improve learning performance		0.701	.663	
Performance expectations Dimensions	PED1	It will improve quality of learning	0.751	0.799	.782	1.316
	PED2	It will be useful in my further study		0.601	.669	
	PED3	It will give flexible time to learn		0.789	.736	
	PED4	It will save time in managing my work		0.816	.847	
Security & risk Dimensions	SRD1	Malicious software such as viruses, worms, Trojan horses erupt during lectures	0.727	0.522	.609	1.321
	SRD2	Privacy is the biggest concern		0.723	.636	
	SRD3	Personal information might be reached to hackers		0.842	.839	

The factors extracted were identified under the following labels.

Infrastructure and Technology Dimensions comprises Low internet bandwidth (0.779), Inadequate training programs (0.769), lack of technical support (0.731) and lack of ICT infrastructure (0.702) and the Cronbach's alpha for infrastructure and technology dimension is 0.763. Students' related dimensions comprises of lack of enough motivation (0.743), lack of enough knowledge (0.739), lack of English language proficiency (0.788) and lack of ICT skills to operate system (0.703) and the Cronbach's alpha for Student's related dimension is 0.849. Faculty's related dimension comprises of lack of compatibility (0.633), challenge related to teaching method & lecture material content (0.726), lecture content quality (0.679) and lack of control over student's engagement (0.669) and the Cronbach's alpha for faculty's related dimension is 0.782. Facilitating dimension comprises of course structure is well defined (0.635), reusable learning objects (0.601), institutions should provide necessary help and resources (0.677), conveyance course framework (0.627), and training & manuals are easily available (0.623) and the Cronbach's alpha for facilitating dimension is 0.824. Social influence dimension comprises the need of this hour (0.771), management understands the strategic advantage (0.786) and it will give recognition among social networks (0.633) and the Cronbach's alpha for social influence dimension is 0.845. Effort dimension consisting of system operating will be very easy (0.728), fewer efforts to understand the online system (0.813) and it will be easily accepted (0.723) and the Cronbach's alpha for effort dimension is 0.704. Perceived usefulness dimension comprise of online education content is not informative (0.632), it will not increase academic productivity (0.776), it won't help to get a better job (0.818) and it will not improve learning performance (0.663) and the Cronbach's alpha for perceived usefulness dimension is 0.629. Performance expectations dimension consists of it will improve the quality of online learning (0.782), it will be useful in my further study (0.669), it will give flexible time to learn (0.736) and it will save time in managing my work (0.847). The Cronbach's alpha for performance expectations dimension is 0.751. Security and risk dimension comprises malicious software such as viruses, Trojan horses erupt during lectures (0.609), privacy is the biggest concern (0.636) and personal information might be reached to hackers (0.839). The Cronbach's alpha for security & risk dimension is 0.727.

**Result of Exploratory factor analysis of Faculty members:**

**Table 4: Final output exploratory factor analysis (faculty members)**

Factor	Acronym	Scale Items	Cronbach Alpha	Communalities	Factor Loading	Eigen Value
Infrastructure and Technology Dimensions	IT1	Low internet bandwidth	0.783	0.741	.830	5.666
	IT2	Inadequate training programs		0.735	.818	
	IT3	Lack of technical support		0.775	.779	
	IT4	Lack of ICT infrastructure		0.728	.754	
Student's related Dimension:	SD1	Lack of enough motivation	0.868	0.683	.788	3.693
	SD2	Lack of enough knowledge		0.767	.792	
	SD3	Lack of English language proficiency		0.859	.840	
	SD4	Lack of ICT skills to operate system		0.735	.762	
Faculty's related Dimension	FD1	Lack of compatibility	0.799	0.659	.778	2.774
	FD2	Challenge related to Teaching method & Lecture content quality		0.716	.780	
	FD3	Lecture content quality		0.727	.727	
	FD4	Lack of control over students engagement		0.725	0.725	
Facilitating Dimensions	FACD1	Course structure is well defined	0.755	0.711	.696	1.901
	FACD2	Reusable learning objects (materials, lectures, etc.,)		0.842	.658	
	FACD3	Institutions should provide necessary help and resources		0.864	.732	
	FACD4	Conveyance course framework		0.877	.711	
	FACD5	Training & manuals are easily available		0.729	.678	
Social Influence Dimensions	SID1	It is the need of this hour	0.820	0.81	.826	1.748
	SID2	Management understands the strategic advantage		0.836	.842	
	SID3	It will give recognition among social network		0.729	.686	
Effort Dimensions	ED1	System operating will be very easy	0.726	0.79	.772	1.634
	ED2	Fewer efforts to understand online system		0.956	.883	
	ED3	It will be easily accepted		0.83	.789	
Perceived usefulness	PUD1	Online education content is not informative	0.699	0.817	.678	1.504
	PUD2	It will not increase academic productivity		0.934	.830	
	PUD3	It will not help me to get a better job		0.895	.902	
	PUD4	It will not improve learning performance		0.775	.736	
	PED1	It will improve quality of learning	0.756	0.846	.835	1.378

Performance expectations Dimensions	PED2	It will be useful in my further study	0.653	.717	
	PED3	It will give flexible time to learn	0.837	.782	
	PED4	It will save time in managing my work	0.893	.891	
Security & risk Dimensions	SRD1	Malicious software such as viruses, worms, Trojan horses erupt during lectures	0.729	0.571	1.303
	SRD2	Privacy is the biggest concern	0.766	0.678	
	SRD3	Personal information might be reached to hackers	0.898	0.888	

Infrastructure and Technology Dimensions comprises Low internet bandwidth (0.830), Inadequate training programs (0.818), lack of technical support (0.779) and lack of ICT infrastructure (0.754) and the Cronbach's alpha for infrastructure and technology dimension is 0.783. Students' related dimensions comprises of lack of enough motivation (0.788), lack of enough knowledge (0.792), lack of English language proficiency (0.840) and lack of ICT skills to operate system (0.762) and the Cronbach's alpha for Student's related dimension is 0.868. Faculty's related dimension comprises lack of compatibility (0.778), challenge related to teaching method & lecture material content (0.780), lecture content quality (0.727) and lack of control over student's engagement (0.725) and the Cronbach's alpha for faculty's related dimension is 0.799. Facilitating dimension comprises of course structure is well defined (0.696), reusable learning objects (0.658), institutions should provide necessary help and resources (0.732), conveyance course framework (0.711), and training & manuals are easily available (0.678) and the Cronbach's alpha for facilitating dimension is 0.755. Social influence dimension comprises the need of this hour (0.826), management understands the strategic advantage (0.842) and it will give recognition among social networks (0.686) and the Cronbach's alpha for social influence dimension is 0.820. Effort dimension consisting of system operating will be very easy (0.772), fewer efforts to understand the online system (0.883) and it will be easily accepted (0.789) and the Cronbach's alpha for effort dimension is 0.726. Perceived usefulness dimension comprise of online education content is not informative (0.678), it will not increase academic productivity (0.830), it will not help me to get a better job (0.902) and it will not improve learning performance (0.736) and the Cronbach's alpha for perceived usefulness dimension is 0.699. Performance expectations dimension consists of it will improve the quality of online learning (0.835), it will be useful in my further study (0.717), it will give flexible time to learn (0.782) and it will save time in managing my work (0.891). The Cronbach's alpha for performance expectations dimension is 0.756. Security and risk dimension comprises malicious software such as viruses, Trojan horses erupt during lectures (0.657), privacy is the biggest concern (0.678) and personal information might be reached to hackers (0.888). The Cronbach's alpha for security & risk dimension is 0.729.

#### CONFIRMATORY FACTOR ANALYSIS:

Confirmatory factor analysis was carried out to identify the fitness of the factors extracted with the help of exploratory factor analysis.

**Table 5: Standardized regression weights and indicator reliability of CFA Model**

Factor	Acronym	Scale Items	For Student		For Faculty member	
			Standardised regression weight	Indicator Reliability	Standardised regression weight	Indicator Reliability
Infrastructure and Technology Dimensions	IT1	Low internet bandwidth	0.678	0.749	0.729	0.785
	IT2	Inadequate training programs	0.672	0.737	0.732	0.773
	IT3	Lack of technical support	0.712	0.698	0.724	0.734
	IT4	Lack of ICT infrastructure	0.665	0.673	0.71	0.709
Student's related Dimension:	SD1	Lack of enough motivation	0.62	0.707	0.707	0.743
	SD2	Lack of enough knowledge	0.704	0.711	0.725	0.747
	SD3	Lack of English language proficiency	0.796	0.759	0.899	0.795

	SD4	Lack of ICT skills to operate system	0.672	0.681	0.725	0.717
Faculty's related Dimension	FD1	Lack of compatibility	0.596	0.597	0.744	0.633
	FD2	Challenge related to Teaching method & Lecture content quality	0.653	0.699	0.624	0.735
	FD3	Lecture content quality	0.664	0.646	0.762	0.682
	FD4	Lack of control over students engagement	0.662	0.644	0.799	0.680
	FACD1	Course structure is well defined	0.648	0.615	0.636	0.651
Facilitating Dimensions	FACD2	Reusable learning objects (materials, lectures, etc.,)	0.779	0.577	0.801	0.613
	FACD3	Institutions should provide necessary help and resources	0.801	0.651	0.846	0.687
	FACD4	Conveyance course framework	0.814	0.630	0.801	0.666
	FACD5	Training & manuals are easily available	0.666	0.597	0.702	0.633
	Social Influence Dimensions	SID1	It is the need of this hour	0.747	0.745	0.827
SID2		Management understands the strategic advantage	0.773	0.761	0.823	0.797
SID3		It will give recognition among social network	0.666	0.605	0.818	0.641
Effort Dimensions	ED1	System operating will be very easy	0.727	0.691	0.827	0.727
	ED2	Fewer efforts to understand online system	0.893	0.802	0.896	0.838
	ED3	It will be easily accepted	0.767	0.708	0.636	0.744
Perceived usefulness	PUD1	Online education content is not informative	0.754	0.597	0.799	0.633
	PUD2	It will not increase academic productivity	0.871	0.749	0.671	0.785
	PUD3	It will not help me to get a better job	0.832	0.821	0.822	0.857
	PUD4	It will not improve learning performance	0.712	0.655	0.725	0.691
Performance expectations Dimensions	PED1	It will improve quality of learning	0.783	0.754	0.763	0.790
	PED2	It will be useful in my further study	0.590	0.636	0.723	0.672
	PED3	It will give flexible time to learn	0.774	0.701	0.873	0.737
	PED4	It will save time in managing my work	0.830	0.810	0.829	0.846
Security & risk Dimensions	SRD1	Malicious software such as viruses, worms, Trojan horses erupt during lectures	0.508	0.576	0.603	0.612
	SRD2	Privacy is the biggest concern	0.703	0.597	0.729	0.633
	SRD3	Personal information might be reached to hackers	0.835	0.807	0.869	0.843

The table 5 shows the standardized regression weight and indicator reliability. As seen from the table 5, the weights of standardized regression of items in the confirmatory measurement model are above value of 0.50 (Hair, 1992) and indicator reliability between individual items were also well above 0.50. This suggests good convergent validity.



**Table 6: Fit indices of Confirmatory Factor analysis of students and faculty members**

Fit Statistics	Measured Value		Recommended value	References
	Student	Faculty		
CMIN/DF	1.823	1.936	< 5	Bentler, 1989
GFI	0.929	0.936	> 0.90	Joreskog & Sorbom, 1979
AGFI	0.976	0.968	> 0.90	Joreskog & Sorbom, 1979
TLI	0.963	0.945	> 0.90	Hu and Bentler, 1999
NFI	0.919	0.927	> 0.90	Bentler, 1992
CFI	0.904	0.909	> 0.90	Hu and Bentler, 1999
RMSEA	0.046	0.036	< 0.05	Hu and Bentler, 1999

Confirmatory factor analysis results confirm acceptable model fit with all fit indices suggested by the various authors in their respective studies. The fit indices with acceptable levels as suggested by authors are depicted in Table 6 for both student as well as faculty members. The result of confirmatory factor analysis confirms the factor extracted with the help of exploratory factor analysis. The result of confirmatory factor analysis supports the result of exploratory factor analysis which suggests that all the dimensions of online education explored contribute in the adoption of online education among students as well as faculty members of Gujarat, India.

#### **PRACTICAL IMPLICATIONS:**

The factors identified with the help of Exploratory and confirmatory factor analysis in the present study have important implications for various colleges, institutes, universities, faculty members and various decision makers. These factors will help online educator providers to establish necessary infrastructure and technical requirements. Practitioners can develop various training modules and operating procedures to enhance the performance of online education. The list of factors explained here can help the online education decision makers to understand the reasons for failure of online education and it will help them to determine the remedial steps for the same. The decision makers can ask the subordinates to provide the feedback related to online education conduction, actual experience, and behaviour of various participants in online education. This can help them understand the various areas of online education in which they can improve. Although we offer the online education dimensions as a reliable and valid measure of factors affecting adoption of online education among students, criteria related validities are also important. The current construct should be correlated with other current indices of the same or related construct. If they differ, our measure will have concurrent validity. The scale presented in this article is well developed and researchers, decision makers and practitioners will find it useful while establishing an online education system.

#### **LIMITATIONS AND FUTURE RESEARCH DIRECTIONS:**

One of the limitations of this research paper is that its scope is limited to students as well as faculty members of Gujarat state in India. The further scope of research is possible to carry out on the students as well as faculty members of various institutes and also various geographical areas available in India which help to make comparison and generalize the findings. The study did not show any comparison between urban areas and rural areas students & faculty members, thus it would be interesting to find how urban students and rural students and faculty members perceive online education and which dimensions affect them the most. The present study focuses only on finding factors affecting adoption of online education among students & faculty members, hence studies related to impact of these factors on attitude, adoption intention and behaviour will help in all online educators. It is important to find out the comparison between online education and classroom education among students which helps to overcome the factors while conducting online education.

#### **CONCLUSION**

The present study tries to identify factors affecting adoption of online education in Gujarat state of India. The study found that Infrastructure and Technology Dimensions, Student's related Dimension, Faculty's related Dimension, Facilitating Dimensions, Social Influence Dimensions, Effort Dimensions, Perceived usefulness, Performance expectations Dimensions and Security & risk Dimensions affects the students' as well as faculty members adoption of online education in Gujarat. The study explains the practical implications of major findings. The findings suggest that the institutions, colleges must focus on the enough infrastructure and facilities, students' and faculties' requirements, and also convince them how online education is necessary and will enhance the careers of students and will benefit the teachers/faculties in execution of online education. It has been more than two decades since the starting of online education, but still in Gujarat the adoption rate of online education is very low. Only due to COVID 19, online education has taken a giant leap. Thus this study enhances the existing literature related to online education and also the identified factors can be utilized for establishing online education.

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## ATTITUDE OF POST GRADUATE STUDENTS TOWARDS BLENDED LEARNING

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### ABSTRACT:

In the current investigation an endeavor to examine the attitude of Post Graduate students towards Blended Learning in Purulia District of West Bengal, India. The Descriptive method was employed. A total of 148 PG Students (Second Semester - 54 and Fourth Semester-94) from Sidho-Kanho-Birsha University in Purulia District of West Bengal were taken as representative samples of the population as a whole. A stratified random sampling technique was adopted to select Post Graduate students. An Attitude Scale (Likert type) was utilized for gathering the data. Mean, S.D., t-test and F-test were used to analyze the data. The study uncovered that the degree of attitude of Post Graduate students towards blended learning in Purulia District of West Bengal is average or moderate. The study additionally uncovered that attitude of Post Graduate students towards blended learning as for their Gender (Male-Female), Locality (Rural-Urban), Semester (2<sup>nd</sup> – 4<sup>th</sup>), Internet User (User- Non user), Family type ( Joint-Nuclear), Caste (Hindu, Muslim, and Sari), Guardians Occupations did not differ significantly. On the other hand, attitude of Post Graduate students towards blended learning with respect to their Streams (Arts, Science and commerce) differs significantly.

**Keywords:** Attitude, Post Graduate Student, Traditional Learning, Online Learning, Blended Learning, Flipped Learning

### INTRODUCTION:

The present era is known as the era of science and technology. Without science and technology, we can't move forward. The field of education is also dominated by technology. In few years ago in the field of education, e-learning plays a fundamental role and it has been continuing even now. Day after day the concept of online learning process becomes much familiar to us. Actually, online learning has so many benefits but due to the proper equipment it does not stand in its peak point. So, our evolving minds are seeking alternatives that will remove the drawbacks of online learning. Such kind of concept promotes to the concept of blended learning. Actually, blended learning is a summation of face-to-face learning and online learning encompasses the temporal and spatial dimension. Sometime it is treated as 'Hybrid learning' or 'Flipped Classroom'. From this new method, learners can achieve two alternatives side by side like the traditional classroom instructor along with technology multimedia-based activities. So, learners can enjoy both of the methods. Blended learning is completely flexible in nature. In this method learners can access online lectures, video, documentaries, assignments, probing questions etc. along with traditional methods.

The rapid development of technology greatly affects the whole education system. Now a days, education and technology cannot stand partition to each other. Technology creates a new thing then educational teaching methods changing with the paralleled with of it (Kazi et al., 2017). In present time, blended learning is dominating the teaching learning method where the learners can avail both the online and traditional learning with more flexibility and also can personalize their learning experience according to the situation. According to Graham (2006) Blended learning is the combination of online and face-to-face instruction. According to Chew, Jones and Turner (2008) blended learning is the amalgamation of education and educational technology. According to Krasnova (2015) "blended learning may be defined as a 'method of teaching that combines the most effective face-to-face teaching

techniques and online interactive collaboration, both constituting a system that functions in constant correlation and forms a single whole.” Blended Learning design focuses attention to nurture social interface and fostering an effective learning environment (Boelens et al. 2017).

So, we can say that blended learning is the combination of offline and online method of learning, along with help of digital multimedia which significantly increases its relevance as well as effectiveness in imparting and performing its desired function. In blended learning, with the help of technology learners’ can learn with their expected time and places (Sheninger, 2019). Blended learning is not a new notion at all rather it came across through various ups and downs. It crosses several phases. The present scenario of this method has not come in a single day. The derivation or the phases of development of this learning started its journey since 1840. Prior to the development of legitimate correspondence and innovation, Sir Pitman sends shorthand by means of postcards and understudies additionally gave appropriate criticism. In the new century, science and innovation has been creating in such manner that the Govt. or on the other hand the private establishments are a lot of cognizant about the advantages of mixed learning. It is so alluring and innovative technique that is the reason it is ruling right now.

As we as a whole realize that the blended learning is the mix of on the web and conventional learning strategy. Normal and online education have their own constraints. Consequently, the majority of the modernized educational institutions blend the two systems into one, which is why the system is known as blended system. The most important rationale to blend these systems was to merge their advantages and removes the disadvantages. Blended learning is flexible, new, and relatively low cost. It is also personalizing in nature. Such kind of nature makes it unique from the other learning methods. This method allows students to learn according to their situation and momentum because the setting in which the learner is situated plays an important role in determining the output of the whole process. If the learner wants to learn, he can learn it whether he or she is at home thus doing away with the rigidity of the formal setting and providing a lucid and mobile scope of learning. Apart from it, the learners can also be able to learn the traditional method too. We can see that the traditional learning is not attractive. It is monotonous and even there is no diversity from the point of curriculum. So, the students may show their negative attitude towards it. For the advancement of technology, mobiles are available in the market. Mainly the students are very much attractive for it. They learn various things from it. They pursue such kind of mental zeal to learn from mobile devices. Apart from it, this method increases the quality or quantity of pupil's interactions. Students can learn part-timely through this method. It will be also benefited for physical disabilities or for whom who live in different cities. Akkoyunlu & Soyly (2006) examined students’ views on blended learning environment. It showed that the students take pleasure in the blended learning environment. Achievement levels and frequency of participation of students influenced their views on blended learning environment. The highest score was given to face-to-face contact in a blended learning application. This finding exemplified the significance of interaction and communication for the success on-line learning. Hinkhouse (2013) found that instructors must be directly involved in the creation of online content and resources for their students for more efficient online learning. Means et al. (2013) found that students in online learning conditions were found to perform modestly better on average than those receiving face-to-face instruction. In those studies that contrasted blended learning with traditional face-to-face instruction, the advantage over face-to-face classes was significant, but not in those studies that contrasted purely online with face-to-face conditions. Neyestani & Babri (2015) exposed that the majority of the respondents said agree with blended learning. Also, statistical analysis showed that there was no significant relationship between varies age and attitude. Khan (2016) revealed that compared to male prospective teachers and those of the arts stream, the female prospective teachers and prospective teachers who were from science streams had a highly favorable attitude towards blended learning methods. Krasnova & Vanushim (2016) revealed that the immediate ramifications for the creation, advancement, and conveyance of online courses in blended learning. Roland et al. (2018) showed that students pursuing a secondary specialization had a more constructive attitude to blended learning in terms of online interaction and technology. Paduraru et al. (2019) found that Undergraduate students have positive perception towards blended learning and the authors are tried to implement a model for undergraduate learners. Attard & Holmes (2020) investigated how teachers use blended learning strategies and how their students respond to these pedagogical practices. Taghizadeh & Hajhosseini (2020) discovered that TEFL students have a very positive perception towards blended learning and online learning environments, meaning that it is very beneficial to their skill, knowledge, and other development. Şenturk (2021) examined the effects of blended learning teaching-learning approach on academic achievement and twenty-first-century skills of preservice teachers during the teaching principles and methods course.

With the importance of blended learning in mind, many questions arise in the minds of the researchers, such as whether or not PG students support this approach in their teaching learning process. Do they support this system? How do they feel about blended learning? In order to find out the answers to these questions, the researchers used the current study to investigate the attitudes of Post Graduate students towards blended learning. The following were the objectives of this study:

1. To discover the attitude of PG students towards Blended learning in Purulia District of West Bengal.
2. To find out the difference between the attitude of Post Graduate students towards Blended learning with reference to their gender, locality, semester, internet access (user & non-user) and family types.
3. To find out the difference among the attitude of Post Graduate students towards Blended Learning with reference to their stream, religion and guardian occupation.

The hypotheses of this study are in the null form:

**H<sub>01</sub>:** There will have more unfavorable attitude of Post Graduate Students towards Blended learning.

**H<sub>02</sub>:** There is no significant difference between the attitude of Post Graduate students towards Blended learning with reference to their gender, locality, semester, internet access (user & non-user) and family types.

**H<sub>03</sub>:** There is no significant difference among the attitude of Post Graduate students towards Blended Learning with reference to their stream, religion and guardian occupation.

## **METHODOLOGY:**

In this study, the descriptive method was used. It is a common and widely used scientific research technique that entails breaking down phenomena into their constituent parts. The primary objective of descriptive analysis is to explain the present state of affairs. This research was intended as an enlightening quantitative approach. As per Gay and Airisian (2009), clear exploration included gathering information all together the test speculations or to address question concerning the current status of the subject of study. It implies that spellbinding exploration would help the analyst in gathering the information.

### ***Population***

All the PG students of Sidho-Kanho-Birsha University treated as population for the present study.

### ***Sample and Sampling Procedure***

148 PG students (54 -2<sup>nd</sup> Semester & 94- 4<sup>th</sup> Semester) of Sidho-Kanho-Birsha University in Purulia District of West Bengal were chosen as a representative sample of the entire population. The sample was chosen using the stratified random sampling technique.

### ***Instrument***

The attitude of PG students towards blended learning was assessed by using an attitude scale (Likert type). The scale was constructed by the researchers. There were 30 positive and negative items on the scale. In scoring procedure, weightage given 5, 4, 3, 2, 1 for positive items and in the case of negative items, reverse scoring was used.

### ***Statistical Techniques***

In order to analyze and represent the collected data, the researchers used Mean, S.D. t-test, and ANOVA.

## **RESULTS & DISCUSSIONS:**

### **Testing of H<sub>01</sub>:**

There will be more unfavourable attitude of PG students towards Blended learning.

Category	N	Mean	S.D
Post Graduate Students	148	114.80	11.87

On the basis of cut-off point the investigators verified the H<sub>01</sub>. The cut-off point here is  $M \pm 1\sigma$ . Mean=114.80., N=148 and  $\sigma=11.87$ . This means,  $114.80 + 1 \times 11.87 = 126.67$  is  $M + 1 \sigma$ . And  $M - 1 \sigma = 114.80 - 1 \times 11.87 = 101.93$ . Most Post Graduate students (71 in numbers i.e., 47.97 percent of Post Graduate students were lies between 101.93 and 126.67 scores, It can therefore be said that the attitude of post-graduate students is moderate or average towards blended learning.

**Table 1:** The attitude of Post Graduate students in Purulia District of West Bengal towards Blended learning

Scores	Frequency	Percentage	Levels of Attitude
Above 126.67	16	10.81	High
Between 101.93-126.67	71	47.97	Moderate / Average
Below 101.93	61	41.22	Low
<b>TOTAL</b>	<b>148</b>	<b>100 %</b>	

**Table -2:** Distribution of t-test regarding various variables

Groups / Variables	Number	Mean	SD	SED	Mean Deference	df	t	Level of Significance	
Male	71	114.35	14.915	1.95	0.87	148	0.45	0.05	Not Significant
Female	77	115.22	8.207						
Rural	100	115.78	8.76	2.07	3.01	148	1.45	0.05	Not Significant
Urban	48	112.77	16.52						
2 <sup>nd</sup> Semester	54	113.04	14.95	2.09	2.78	148	1.33	0.05	Not Significant
4 <sup>th</sup> Semester	94	115.82	9.62						
Internet user (Yes)	91	113.56	13.35	1.99	3.23	148	1.62	0.05	Not Significant
Internet user (No)	57	116.79	8.79						
Family (Joint)	92	114.62	13.37	2.02	0.49	148	0.24	0.05	Not Significant
Family(Nuclear)	56	115.11	8.98						

**Testing of H<sub>0</sub>:**

**Gender (Male & Female)**

From the table-2 in respect of PG Male and Female students, it can be recognized that the df is 148. Therefore, at a level of 0.05, if it is 1.98 or more a t-test is significant. Since the estimated value of 't' 0.45 is less than the table value 1.98 ( $0.45 < 1.98$ ), the disparity in attitude between PG Male and Female students toward blended learning is not significant at level 0.05. It is fair to say that there is no significant difference in attitudes toward blended learning among PG male and female students. It may be because of male and female students have almost same zeal and both have mobile devices too. Therefore they can access this online and offline learning method very easily.

**Locality (Rural & Urban)**

In the case of PG Rural and Urban students, from table-2, it can be found that the df is 148. Therefore, at a level of 0.05, a t-test is significant if it is 1.98 or more. The difference in attitude between PG Rural and Urban students towards blended learning is not significant at the 0.05 level since the approximate value of 't' 1.45 is lower than the table value of 1.98 ( $1.45 < 1.98$ ). Basically, it is happened that urban students have always shown more positive attitude than rural students, but in this context they all have same attitude towards blended learning. When the researchers are trying to find out the reason, they realize that Purulia is rural city; it is not a big city, geographical area is also not large that is why the attitude of PG students towards blended learning not differ significantly, that mean they have almost same attitude towards blended learning.

**Semester (2<sup>nd</sup> & 4<sup>th</sup>)**

From the table-2 in respect of PG 2<sup>nd</sup> and 4<sup>th</sup> Semester students, it is possible to find that the df is 148. Therefore, at a level of 0.05, a t-test is significant if it is 1.98 or more. As the estimated value of 't' 1.33 is less than the table



value of 1.98 ( $1.33 < 1.98$ ), at level 0.05. So it is said that, there is no noteworthy disparity between the attitude of PG 2<sup>nd</sup> and 4<sup>th</sup> semester students towards blended learning. Today's learners are very much modern throughout graduation level. They learn to use mobile devices or computers from graduation level. So they developed their attitude towards online mode from the graduation level. The gap between 2<sup>nd</sup> and 4<sup>th</sup> semester is only 6 months. 6 months of difference is not a contributing factor for significant difference in the attitude of PG students towards blended learning.

**Internet (User & Non User)**

The df is considered to be 148. A t-test is also significant at a level of 0.05 if it is 1.98 or more. At level 0.05, It is not significant since the approximate value of 't' 1.62 is lower than the 1.98 ( $1.62 < 1.98$ ) table value. Hence, there is no considerable variation between the attitude of PG Internet user and the non-internet user students towards blended learning. It appears that we expected that internet user should have positive attitude towards blended learning but in this context we can not found any significant difference in their attitudes. Although no-internet user have some experience from their peer groups or TV or from anyone.

**Family Types (Joint & Nuclear)**

From the table-2 in respect of PG Joint Family and Nuclear Family students, it can be known that the df is 148. Therefore, at a level of 0.05, a t-test is significant if it is 1.98 or more. As the estimated value of 't' 0.24 is lower than the value in the table 1.98 ( $0.24 < 1.98$ ), at level 0.05, the difference between the attitude of students of the PG Joint family and the Nuclear family towards blended learning is not significant. As we know that this study is on blended learning, if the study will about online or e-learning or m-learning then we expect that nuclear family's students have more favorable attitude, because it would be the matter of expenditure of family. However, since blended learning is a mixture of online and offline learning, the effect is negligible.

**Testing of H<sub>03</sub>:**

**Stream (Arts, Science & Commerce)**

**Table- 3: Results of one way ANOVA for Stream**

Sources of Variance	df	Sum of Squares	Mean Square	F	Level of Significance	
Between Groups	2	3347.275	1673.64	13.97	0.01 & 0.05	Significant
Within Groups	145	17372.042	119.81			
<b>Total</b>	<b>147</b>	<b>20719.32</b>				

The calculated F-value from Table-3 (13.97) is established to be greater than the critical value of F (4.75 & 3.06) for 2 and 145 df at significance levels of 0.01 and 0.05. It indicates that the attitude towards blended learning among the PG students with respect to their stream differs significantly. It is therefore concluded that streams have a significant effect on the attitude of PG students towards blended learning. In this study this is the one result where it differs from each other. In respect of stream, we know that arts students are always traditional and they are technically not so sound, on the other hand commerce and science students are technically sound, they uses internet online classes from the graduation level and they uses laptops or computers for their practical work from very beginning of higher education.

**Religion (Hindu, Muslim & Sari Dharma)**

**Table- 4: Results of one way ANOVA for Religion**

Sources of Variance	df	Sum of Squares	Mean Square	F	Level of Significance	
Between Groups	2	167.28	83.638	0.59	0.01 and 0.05	Not Significant
Within Groups	145	20552.04	141.74			
<b>Total</b>	<b>147</b>	<b>20719.32</b>				

From Table-4, at the significance level of 0.01 and 0.05, the calculated F-value (0.59) is found to be less than the critical value of F (4.75 & 3.06) for 2 and 145 df. It shows that the attitude towards blended learning among university students with regard to their religion does not vary significantly. It is also concluded that religious faith has no major impact on the university students' attitude towards blended learning. In present era, mobile, internet, laptops computers are available to irrespective of class-caste-religion, upper class and lower class students'. So it is very natural to say that in respect of religion, students' have no significant attitude towards blended learning.

### Guardian Occupation

**Table-5: Results of one way ANOVA for Guardian Occupation**

Sources of Variance	df	Sum of Squares	Mean Square	F	Level of Significance	
Between Groups	2	145.63	72.82	0.513	0.01 and 0.05	Not Significant
Within Groups	145	20573.69	141.89			
<b>Total</b>	<b>147</b>	<b>20719.32</b>				

From Table-5, the measured F-value (0.513) is found to be less than the critical value of F (4.75 & 3.06) for 2 and 145 df at significance levels of 0.01 and 0.05. It demonstrates that there is no significant difference in the attitude of university students towards blended learning with respect to their Guardian's occupation. It is therefore concluded that the occupation of the Guardian has no meaningful effect on the attitude towards blended learning among the University students. We said it before that if the method of learning will only through online version, then we can see another result. But is the benefits of blended learning that poor or rich students' can also avail this kind of learning method. So as expected in respect of guardian occupation have also no significant result towards blended learning.

### CONCLUSION:

The present research is carried out to ascertain the attitude of PG students towards Blended Learning. The study results show that there is an average level of attitude of PG students towards Blended learning (47.97%). Though there is almost similar numbers of students (41.22%) possess low level of attitude towards Blended Learning and only a few numbers of students (10.81%) have high level of attitude towards Blended Learning. In relation to gender, locality, semester, Internet usage, family type, religion and occupation, there is no considerable differentiation in PG students' attitudes toward blended learning. Furthermore, there was a considerable difference in the attitude of PG students toward blended learning depending on their stream. As a result, today's students are technology natives. Furthermore, the use of technology in the teaching-learning environment makes the process more effective and essential. So it's a high time to infuse technology with the teaching-learning environment. So that students can discover the knowledge and information by their own choice, level and pace. Hence the significance of blended learning takes place. And Blended Learning has got a wide acceptance in higher education in all over the world. Viewing this scenario the present results are not acceptable. From this it can be concluded that there is a strong need of awareness program about Blended Learning and it is extremely necessary among the PG students of Purulia district.

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## BLENDING LEARNING DURING PANDEMIC (COVID 19): STUDENTS' PERSPECTIVE

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### ABSTRACT

This paper discusses about students' motivation towards blended learning method in application in the pandemic situation of COVID 19 through a small survey conducted upon Under Graduate students of West Bengal. A questionnaire was developed using online platform (jotforms) and circulated among students through social contacts. UG students belonging to age group of 18-21 were targeted in the study. 75 responses were received on line as recorded. Students are seen to be keen to attend online classes but in conjunction with on-site classes in the pandemic situation. They appreciate the importance of online classes. However, in so far as testing or evaluation is concerned a majority of them do not favour online mode currently.

### INTRODUCTION

In the year 2020, when the entire world is fighting together against COVID 19, like several other facilities, education system in our country is going through a major transformation. All the stakeholders of education are trying to cope up with this newly developed situation and in this process, social experimentation has become obligatory to find out necessary solutions. In this current situation, where it is difficult to predict the upcoming scenario, experimentation with online teaching and learning is on demand. Current worldwide trend is to expose the learners to technology based virtual means of learning. Blended learning method might be considered as a solution in the post pandemic situation. This paper discusses the scope of blended learning method in application in the pandemic situation of COVID 19 through a small survey conducted on UG students of West Bengal.

Blended learning is a composite method where teaching and learning takes place both online and on site, i.e. at the institution. According to **Garrison & Kanuka (2004)**, the current trend that is complementing face to face classes with internet-based materials is known as "blended learning". Although this is much popular in several countries, in India, general education system depends on regular mode of communication inside the institution, sometimes supported by online mode of information sharing. **Sharpe & Benfield (2005)** found little researches in the field of blended learning at undergraduate level, and most researches have focused on the different methods of teaching and on the innovations introduced; however, no research was found on the students' experiences. **Lopez-Perez et al. (2011)** found that the use of blended learning reduced dropout rates and also helped in improving score in examinations. Moreover, the students' concepts of blended learning were found to be interrelated, with their final marks depending on the blended learning activities, and on their age, background and class attendance rate. In a large urban university, **Owston, York and Murtha (2013)** examined the relationship between student perceptions in blended learning courses and their achievement. A remarkably strong relationship was found between perceptions and grades. Moreover, blended learning was found to be more effective and interesting to high achievers. **Stockwell et al. (2015)** conducted a randomized controlled trial of blended learning and found that problem solving inside the class boosted performance in examination, and attendance and satisfaction increased when video assignments were given. Due to student protests that interrupted normal classes at many South African universities during 2016, teaching and learning had to be shifted to complete the academic year successfully. **Louw and Thukane (2016)** tried to understand how the use of technology influenced teaching-learning during lecture disruptions. It was also observed how blended learning can be used in best possible way in teaching science. In India, **Kharb and Samanta (2016)** found that blended learning increased the interest of majority of the anatomy students in the subject. It also motivated them to develop independent learning skills. Teachers agreed that blended learning encouraged students to do self-study and increased learning. **Dziuban et al. (2018)** argued that Blended Learning merge around access, success, and students' concept of the learning environments. They also reported that blending at times increases access for most students and produces improved success rates. **Westerlaken et al (2019)** suggested that blended learning enhances effective learning for postgraduate health care professionals. It added social value through collaboration and interaction among the professionals during online preparation. **Ivanova and Vishnekov (2020)** found learning outcome to be improved in a blended learning course at university level in an experimental study. **Giovannella (2020)** conducted a study in Italy at graduation level to find the effects on learners by the sudden shift of the teaching-learning processes from physical to completely online due to Coronavirus epidemic. It was found that although the learners miss classroom settings and face-to-face activities, this sudden switch has been positively accepted by them. **Adnan and Anwar (2020)** surveyed undergraduate and postgraduate students to find their outlook about online education in Pakistan. They found that online learning

cannot produce desired results in countries like Pakistan, where majority of students do not have access to the internet. **Khan et. al. (2020)** found that the students of Indian college have positive perception towards online learning and have accepted this new learning system during COVID pandemic. **Radha et al. (2020)** conducted a study to find out view of Indian and International students towards e-learning. The findings showed the impact of online learning, students' interest in using online learning resources, and their performance. **Kundu et. al. (2020)** found that blended learning ambience increases students' classroom engagement in an elementary classroom in India when teachers were supported with necessary proficiencies. **Muthuprasad et. al. (2020)** focused to understand perception and preference of Agricultural Student of India towards the online learning during pandemic and found most of the students preferred online classes because of its' flexibility and convenience. However, internet connectivity problems are found to be a major issue in rural areas. **Bączek et. al. (2021)** also studied the advantages and disadvantages of online learning among medical students during COVID-19 pandemic and found the advantages to be the ability to stay at home, continuous access to online materials, learning at one's own pace, and comfortable surroundings. Technical problems of equipment were found to be one of the disadvantages. However, online learning was considered less effective than face-to-face learning in terms of increasing skills and social competences. **Gjestvang et. al. (2021)** found blended learning programme to be a solution for adult learners who live in villages and working as well as have responsibilities for children and family. **Thabet, Hill and Gaad (2021)** showed that the university academic staffs in a university of UAE understand the importance of incorporating blended learning and they are willing to administer any innovation that would help students if professional training is provided. In a qualitative study, **Bruggeman (2021)** investigated for teacher attributes required to implement blended learning. Adaptive attributes such as understanding the need for change in pedagogy, creatively connecting technologies with learning etc. were found to be important. In this sudden developed pandemic situation, where the Indian Government is bound to shut down educational institutions, online mode of education has taken front seat in India also. However, at the same time, it is important to take an account of the socio-economic backgrounds of our students as well as technological drawbacks which might cause hindrance in online mode of education.

### OBJECTIVES

The research aims

- To find out UG students' motivation towards blended mode in West Bengal;
- To study the preferred mode of teaching-learning and evaluation of UG students in West Bengal.

### METHODOLOGY

This study reveals the perspective of undergraduate students of West Bengal towards online as well as on-site mode of teaching- learning. A questionnaire comprising of 22 close- ended questions was developed on online platform (jotforms) and circulated among students through social media in June, 2020. UG students belonging to age group of 18-21 were included in the study. Purposive sampling technique was followed. 75 responses were recorded from undergraduate students.

### RESULT AND DISCUSSION

The survey shows interesting results. From the data received through the online survey of 75 UG students, total 4 students are studying commerce, 11 studying humanities and 60 students are from science background. Table 1 shows the distribution of students according to their gender and discipline.

Gender	Residence				Grand Total
	Metro city	Rural Area	Semi Area	urban Urban Area	
Female	14	8	9	26	57
Male	3	5	3	7	18
<b>Grand Total</b>	<b>17</b>	<b>13</b>	<b>12</b>	<b>33</b>	<b>75</b>

Table 1: Distribution of 75 UG students

Gender	Discipline			Grand Total
	Commerce	Humanities	Science	
Female	1	8	48	57
Male	3	3	12	18
<b>Grand Total</b>	<b>4</b>	<b>11</b>	<b>60</b>	<b>75</b>

Table 2: Distribution of students according to their gender and residence

Table 2 shows the distribution of students according to their gender and area where they live. It is found that 98.67% students have at least one gadget to access internet. Although only 12% students have Home WiFi, rest 88% students use mobile data pack (Table -3) for which they spend Rs. 100 and above (Rs. 100 – Rs. 300 & above) monthly. Interestingly, only 8% students spend less than an hour on social media daily, 34.67% students spend 1-2hours daily, 28% students spend 2-3 hrs daily and 29.33% students spend more than 3 hours daily on social media platform. However, 94.67% students use internet for the purposes other than social media also.

Device	Home WiFi	Mobile datapack	Grand Total
Android touch-screen phone	1	39	40
Android touch-screen phone; Desktop	4	6	10
Android touch-screen phone; Keypad phone	-	5	5
Android touch-screen phone; Laptop	4	7	11
Android touch-screen phone; Laptop; Desktop	-	1	1
Android touch-screen phone; Laptop; Desktop; Keypad phone	-	1	1
Android touch-screen phone; Laptop; Desktop; Tablet; Keypad phone	-	1	1
Android touch-screen phone; Laptop; Keypad phone	-	4	4
Keypad phone	-	1	1
Laptop	-	1	1
<b>Grand Total</b>	<b>9</b>	<b>66</b>	<b>75</b>

Table 3: Distribution of students acc. to devices available Vs Access to Internet

Another interesting fact is that, in this pandemic situation, 84% students have attended online classes (Table 4) irrespective of their location of residence. 85.33% students stated that online classes are necessary in this situation.

Residence	Attended Online Class		Grand Total
	NO	YES	
Metro city	2	15	17
Rural Area	1	12	13
Semi urban Area	4	8	12
Urban Area	5	28	33
<b>Grand Total</b>	<b>12</b>	<b>63</b>	<b>75</b>

Table 4: Distribution of students attended online class and their residence

When they were asked about their preferred mode of class, 45.33% students opted for on-site class inside the institution and another 45.33% students were found to be comfortable with both the modes (Chart 1).

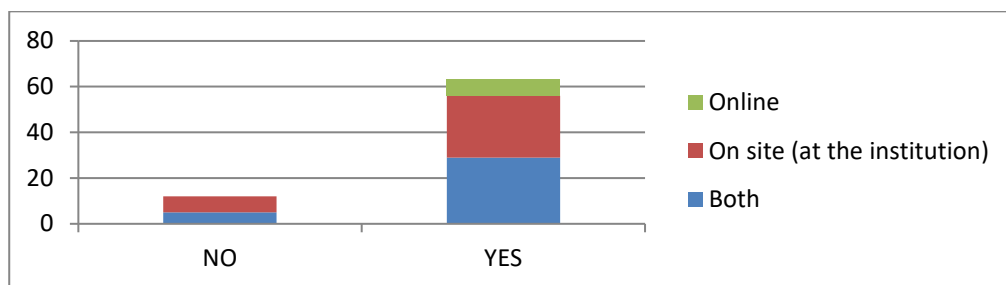


Chart 1: Distribution of students according to their preferred mode of class vs. attended online class

However, when they were asked about effectiveness, total 57.33% students stated that on-site classes are more effective, and 21.33% students stated that both the modes are equally effective though 20% students stated that these two modes were not comparable (Table 5).

Effectiveness	Attended online class		
	NO	YES	Grand Total
'Actual' class is more effective	9	34	43
Both equally effective	-	16	16
Not comparable	3	12	15
'Virtual' class is more effective	-	1	1
<b>Grand Total</b>	<b>12</b>	<b>63</b>	<b>75</b>

Table 5: Distribution of students according to their experience of online class vs. effectiveness of the modes

In the question of preferred mode of evaluation, 57.33% students opted for pen- paper mode, and 29.33% students were found to be comfortable with both the modes. Only 13.33 % students preferred absolute online mode of evaluation.

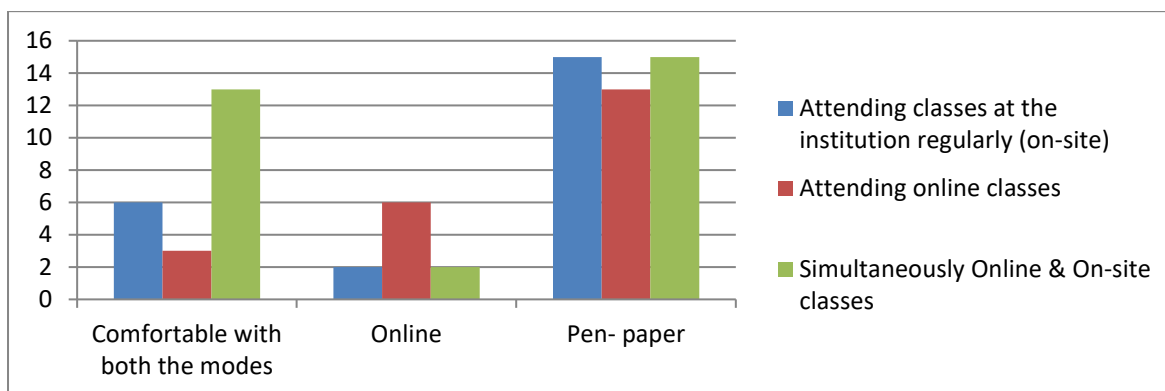


Chart 2: Distribution of students acc. to their preferred mods of class and evaluation

## CONCLUSION

From this study we come to know that students are very much motivated in attending online classes in the pandemic situation. They are aware of the situation where they agree to the fact that online classes are necessary. College teachers are also trying hard to meet the need of the hour. However, a large number of students still believe that actual classes are more effective. A major change in attitude of students was found in case of preferred mode of evaluation. They still prefer to give examination on paper. That might be due to examination fear or lack of knowledge about online mode of education. Further study is required to reveal the associated factors. Although this study does not focus on socio-economic status of the students directly, it is a very important factor of consideration for the policy makers in a developing country like India. Without massive state support online mode of education is not going to make any headway in the realm of quality learning.

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## EFFECTIVENESS OF ONLINE TEACHING AND LEARNING PROCESS IN SEMI URBAN AREAS- AN EMPIRICAL STATISTICAL STUDY

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### ABSTRACT

Online teaching is becoming a necessity for the students to learn things in the Covid19. Many of the educational institutions are still closed due to the pandemic, but the learning process is in progress with the support of online teaching. It helps the students to learn courses from their teachers, complete assignments, and equip themselves. The purpose of the study is to find out the effectiveness of online teaching among the students of semi-urban areas. The research behind choosing the topic is to analyze the impact of online teaching on students learning and the facilities available to access the content online. In this study, the researcher studies the effectiveness of online teaching among the students in semi-urban areas of Nagapattinam district, South India. The researcher has chosen 117 samples to measure the effectiveness of online teaching in educational institutions. The research has reached the conclusion based on the results.

**Keywords:** education, semi-urban students, online learning, technology, interest in learning

### INTRODUCTION

The journey towards education is demanding the learners to improve their competence in the area of online learning. To attain the destination of knowledge in education, a continuous learning concept should be incorporated among the students. The face of learning has been changing in different situations and periods. It would have started from Gurukulam- the students stayed at teachers' home and learned to schools and learning courses using online. The concept of teacher-centric has drastically reformed and students' centric education has been implemented. The school of education highlights the concept of outcome-based education and not output-based education. The students are assessed not only for the performance but also for their attitude. Online learning can be effectively done through the transformation and integration of knowledge between the teachers and students.

The present education is giving a new direction to education. The fast and furious development of technology in the present world gives many avenues to the learners to equip new concepts through various modes of learning. There are various methods to learn the concept from pen and paper to technology-based learning such as iPod, tablet, kindle, laptop, smartphone, etc., At the same time measuring the retention rate of the students who have chosen online-only degrees are difficult to measure because many students have opted both online and on-campus courses (Brown, V.S., Strigle, J., Toussaint, M. (2020). In this techie scenario, the usage of smartphones is inevitable to learn much information. During this pandemic situation, many of the schools, colleges, and universities are conducting classes through online mode such as taking classes, giving assignments, conducting group discussion, presenting. Haythornwaite, C., & Andrews (2007) the students get rich technology-based knowledge and have interaction with other knowledge-sharing sites inside and outside the classroom. Bozkurt and Sharma, 2020, Quintana and Quintana, 2020, Sahu, 2020 specified in their studies that intellectual and corporal well being is to be given primary importance by the educational institutions than focusing on curriculum.

This study is mainly focused on the effectiveness of online classes among the students who are being in semi-urban areas within Nagapattinam District, South India. Online teaching is an inevitable part of the students learning environment in this pandemic situation. The Ministry of education is striving to enrich the knowledge of students through different forums like NCERT, SWAYAM, NPTEL, HEI, etc., Many research-oriented programs are initiated by the Government bodies such as DST, MNRE, ICSSR, TNSCST, etc., to motivate the student's research knowledge with financial support. Effective implementation of all the practices can be done with well-trained and motivated teachers. The success of online education depends on the efficient teacher,

motivated students, and effective system of learning. All the above-mentioned factors have stimulated the researcher to execute the study on the effectiveness of online teaching among the students in semi-urban areas of Nagapattinam district.

## REVIEW OF LITERATURE

Neuhauser, C. (2002) investigated two sections of students who have chosen the same course. At the end of the study, it is observed that 96% of the student responded that online course is more effective than one to one classes. It is studied that there are no differences in test scores, assignment submission, and final grades. Patrick, S., & Powell, A. (2009) in their study on virtual learning, measuring the student performance is better or good compared to the students having a face to face interactions. Maki, Maki, Patterson, and Whittaker measured improved efficiency students on content questions of examinations enrolled in an online introductory psychology course. Vavolua (2005) pointed out that the technologies can be used in education efficiently in science during lectures, seminars, field trips, and using the technology the students can collect scientific data. Prensky (2004) said that the students can learn the subjects taught by the teachers online. Tindell and Bohlander, (2012) highlighted in their research that the fast growth of technology helps the students to learn new information and can score high marks in schools. Wood et al. (2012) observed the impact of learning through electronic media has increased even attending college classroom lectures. The students can collect information from various sites and update their knowledge. Gretchen Kerbs (2012) stated that online education will create a huge impact on student's achievement and the benefits will be more than the risks. Escobar Fandino and Silva Velandia (2020) indicated in their research that the teachers have to identify various practices for developing the students to learn things online methods. Troussas et.al., (2020) highlighted that students have to be developed inherently to employ technology, and teachers have to make use of this condition to reinforce students' commitment and learning. Many online classes have to be prepared and offered to school children and the students residing in detached places to access learning adaptability. (Smith, Burdette, Cheatham, & Harvey, 2016; Zalaznick, 2019). Thabet et al., (2020) highlighted that the mindset of the faculty members is optimistic and most of them are conscious of the advantages of using online learning in the educational system. Bao, 2020; Rapanta et al., (2020) highlighted that the combination of networked learning may be collaborated with practical and tutorial support to improve the quality of education.

## OBJECTIVES OF THE STUDY

1. To analyze the effectiveness of online education among the students in semi-urban areas of Nagapattinam District.
2. To find out the accessibility of delivery through online mode.

## HYPOTHESES

1. There is no significant difference between online teaching in educational institutions.
2. There is no significant relationship between the quality of teaching and the effectiveness of online teaching

## RESEARCH METHODOLOGY

Research is a plan of investigating a problem to reach solutions. The research structure adopted for the study is descriptive research. In this research, the effectiveness of online education is assessed by the college students of the Nagapattinam region of Tamilnadu State, India. An organized survey was prepared to mobilize the data from the respondents. The validity of the questionnaire is tested to measure the quality of the questionnaire. A pilot study was conducted among the students with the draft questionnaire for getting an opinion about the survey. The survey was confirmed based on the opinion given by the respondents and the experience of the researcher for his in-depth knowledge in this study. The sample size for the study is 117 respondents. The researcher has collected secondary data from magazines, journals, and websites.

### Statistical Tools

The collected data were analyzed using SPSS and statistical tools such as 1. Multiple Regression 2. Correlation and 3. Reliability test

### Table Reliability test

**Table 1 Reliability Statistics**

Cronbach's Alpha	N of Items
.862	25

A reliability test is conducted to measure the internal consistency of the coefficient using Cronbach’s alpha. A reliability test has been applied to check whether the random error influencing the inconsistency of the data and in turn, it reduces the reliability is at a controllable level or not.

From the table, it is observed that the result of the Cronbach’s alpha test is 0.862. It shows that internal consistency reliability is at a satisfactory level.

**H1: There is no significant difference between online teaching in educational institutions.**

The information provided in the coefficient table is analyzed to measure if one or more independent variables are significant predictors of the effectiveness of online teaching. It is concluded that one independent statement is statistically significant.

The standardized coefficient beta column discloses that quality of teaching has a beta coefficient of 0.276 which is not statistically significant at 0.000, Coverage of portions has a beta coefficient of 0.266 which is not statistically significant at 0.000, and accessing of delivery has a beta coefficient of 0.375 which is statistically significant at 0.000.

Multicollinearity of the independent variables is calculated with the size of Tolerance and VIF. Multicollinearity between the independent variables is high, and then there is no meaning to hold many independent variables with similar information. This can be assessed when the tolerance value is smaller than .10 and the VIF is 6 or larger, then multicollinearity is a problem.

Here the tolerance value is more than 0.1 and the VIF is less than 0.6 which means there is no multicollinearity among the independent variables.

**Predicted Value of Effectiveness of online teaching**  
 $=2.792+0.245$  (Quality of teaching)  
 $+0.257$  (Coverage of Portions)  
 $+0.390$ (Accessibility of delivery)

**Table 2 Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	2.792	1.101		2.536	.013		
Quality of Teaching	.245	.079	.276	3.103	.002	.283	3.536
Coverage of Portions	.257	.104	.266	2.463	.015	.191	5.236
Accessibility of Delivery	.390	.103	.375	3.786	.000	.227	4.400

a. Dependent Variable: Effectiveness of Online teaching

**H2: There is no significant relationship between the quality of teaching and effectiveness of online teaching**

**Table 3 Correlations**

		Quality of Teaching	Effectiveness of online teaching
Quality of Teaching	Pearson Correlation	1	-.151
	Sig. (2-tailed)		.107
	N	116	116
Effectiveness of online teaching	Pearson Correlation	-.151	1
	Sig. (2-tailed)	.107	
	N	116	116

From the above table, it is observed that the significant value is 0.107 which is more than 0.05. to reject the null hypothesis. Hence there is a significant relationship between the quality of teaching and the effectiveness of online teaching.

## CONCLUSION

Education is an enviable part of a human being now a day. It helps the people to be civilized and learning things to the needs of the current and modern world. Education is an investment to every learner to equip themselves and survive. The penetration of the internet in nook and corners make the people access facility of learning things through online. At the same time, still, there is a problem in semi-urban areas in accessing the internet facilities thereby it will be difficult for many of the students to continue their learning. Also, the students from semi-urban backgrounds can enrich their knowledge better in classroom education than in online education. The teachers have to understand the practical difficulties faced by the students and while teaching the teacher tries to focus more on the students who come from the extreme semi-urban environment. The pace of coverage of portions may be decreased and in-depth teaching may be concentrated to uplift the life of students in semi-urban areas.

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## INVESTIGATING DIGITAL LEARNING MEDIA FOR SKILL ENHANCEMENT PROGRAMMES

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### ABSTRACT

Digital learning media is a definite need for the current industry. Combining digital activities into the broader strategy becomes a challenge as the companies don't yet have strong digital capabilities. The study aimed to explore the students' perception and digital platforms towards the Effective Use of Digital media for Skill Enhancement programs of the educational institutes offering technical courses. The study was conducted to identify gaps in existing systems and effective use of digital marketing tools of various skill enhancement programs, which can be introduced by technical courses institute to enhance the profitability and brand image. The study employed Quantitative Methods and descriptive research for data collection and report compilation. The paper concluded the two factors, namely Job Specific skills and Careful Planning, that influence customer perception of online marketing for skill enhancement programs. The findings may contribute to the existing knowledge of e-learning technology as an educational resource. The results may also benefit the practitioners in customizing online programs in the institutions.

**Keywords-** Perception, Digital, Institution, Learning, Education

### INTRODUCTION

Digital marketing tools are the definite need for the current industry, and combining digital activities into the companies' broader level can be challenging in the absence of substantial digital capabilities. Educational institutions are motivated by the exponential growth of educational technologies to perform with options to the orthodox classroom teaching methods (Favetto et al., 2003). Computer-generated Simulations, videodiscs, CD-ROM, Internet, and the World Wide Web are some of the interactive educational technologies suggested by the researcher (Cavanaugh, 2001). The most preferred avenue is web-based online learning for teaching and learning at a distance (Hurt, 2005). Online activities have become an integral part of any marketing and sales strategy.

Department of Business Innovation and Skills had surveyed in the UK and found that using digital learning in the education system is a long-term solution. The need to expand the digital capabilities in the shorter term is a necessity. Online media is the key to increasing capacities in exploiting digital opportunities in offering courses on digital and awareness actions through existing local private and third sector networks. The need to promote cybersecurity is also required.

The Capgemini report mentions the effect of digital technologies on the IT department and the entire organization and creates massive advances in digital skills. Online media offer academia an opportunity to connect learners in the online classes and to support in developing learner skills (Blaschke, 2014)

The digital power of platforms in the course delivery is unsurpassable. A brief plan of organizations is desirable to respond to customer queries. The skill enhancement programs need to be innovative in delivery format. The various tools of digital marketing are Content Marketing, Big Data, Email Marketing, Mobile Marketing, Social Media Marketing, Conversion rate optimization, Search Engine Optimization PPC and affiliate. Chaffey, in 2015, has suggested the top three digital marketing tools as Content Marketing, Big Data, and E-Mail Marketing.

Tedlow (2010) examined in his study the companies who look away and go into denial on the emergence of paradigms shift. Carey (2012) indicated that the Online Courses would change the future of higher education, namely MIT, Harvard, and other universities offer free MOOCs.

From the student's perspective, the earlier research that online courses are required for the institutes and course developers to customize their studies more effectively and enhance students' course satisfaction (Morss, 1999). The study further indicated the students of online learning courses show positive learning experiences. The advantages of online learning are flexible interactions and ease of use.

## Literature Review

The study undertaken by Lai (2004) to comprehend the online course design interface on 140 students enrolled in either partially online or entirely online courses revealed that navigation of the sessions was smooth, and students were pleased with the online course design. Morss (1999) states that the students' perceptions of online course management systems found that the online environment enables them to concentrate and learn the subject faster.

Online learning adoption in higher education grows owing to its flexible learning environment where learners can collaborate and communicate irrespective of specific time and location (Kundi& Nawaz, 2010). The study of 295 students in 16 online learning courses at two public universities in Taiwan identified seven factors that influence online learners' satisfaction, like instructor attitude, computer anxiety, course flexibility, perceived usefulness, course quality, perceived ease of use, and assessment (Sun, Tsai, Finger, Chen, and Yeh, 2007). Additionally, it disclosed that course quality is a crucial factor for the learners.

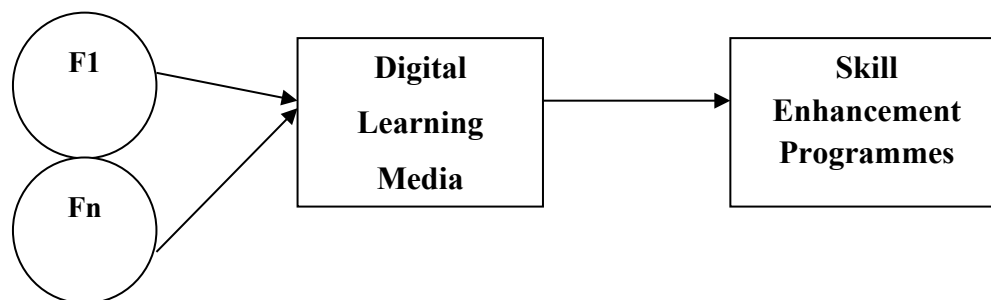
Bers (2010) contended that technological development aims to guide students in the complimentary use of technology to have more fulfilling lives for their future work or achieve innovative thinking to make the world a better place. The newness and the growing availability of computers have given educators a chance to design more on how to teach. (Paul A. Soukup, 2011). The delivery of digital media programs is guided by the framework that helps in implementation (Chien, 2012). Some of the e-learning methodologies are technology-integrated teaching methods, project-based learning (Epure et al., 2017). The support systems of digital learning are MOOC-massive open online courses, mobile learning (Xu, Hong, 2016). The teachers of digital learning methodology use increases in education as per research in the last three years. These technologies enhance students' engagement, and innovations such as mobile technologies, tablets, and smartphones' applications have become more and more popular among higher education students (Cruz et al., 2017). Edtech can produce data and become policy-relevant amid demands for evidence for what works (Jarke and Breiter, 2019). There were difficulties with securing student anonymity (Bayne et al., 2019). The study also focused on a conceptual framework that includes a broader view of teacher digital competence(Falloon,2020).

## The rationale of the study

The research aims to identify the digital platforms available for educational institutions in delivering skill enhancement programs and their promotion. The study is focused on student opinions on digital learning and its role in skill enhancement programs. Students' expectations and experiences in the areas of course format, technological support, interaction with Faculty and peers, course flexibility and pace, assessment and feedback, and overall communication. The primary study aims to explore the differences in existing courses and various skill enhancement programs that can be introduced by educational institutes to enhance profitability and brand image.

## Conceptual Framework-

**Figure 1- Conceptual Framework of Digital Media for Skill enhancement Programmes**



## Research Objectives

This research explores the tremendous digital platforms available for the company in delivering skill enhancement programs and their promotion. The study will identify gaps in existing courses and effective use of digital marketing tools of various skill enhancement programs, which the educational institutes can introduce to enhance the profitability and brand image.

## **Methodology**

### **Research Design**

The study is descriptive. The data collection employed Quantitative Methods. The data collection was with the help of a structured questionnaire after pilot testing. The judgment sampling was applied to the segments of students studying in technical educational institutes based on their Under Graduate, Graduate, and Post Graduate Degree. The sample size was 500 and from Asia. The analysis was carried out using statistical techniques like factor analysis, independent t-test, chi-square, and SEM.

### **Sample Design**

The sample size is 500, and the sampling techniques used for data collection are intercept sampling. The sample is collected from the premier educational institutes in India.

### **Questionnaire**

A structured questionnaire has 16 statements on a 5-point Likert scale and five means 'strongly agree', and 1 for 'strongly disagree.' The Questionnaire had two significant sections. The first section intended to capture the respondent's demographic profile; the second part was related to the respondents' perception of digital learning effectiveness for skill enhancement programs. The work had applied the content check-in to its Questionnaire. Content verification of the Questionnaire was established by approaching academicians and corporate. Subsequently, the validity of the surveys was tested and administered.

### **Data Collection**

#### **Primary Data-**

The self-administered Questionnaire was used to collect the Primary data and was designed explicitly for the study. The survey included questions related, namely, the five issues based on the sample's demographic characteristics, such as gender, age, and education level. The data from relevant secondary sources was also part of designing an appropriate questionnaire and gain deeper insights into the domain.

It was prepared to explore the essential factors while choosing courses of the educational institutes via digital media. Questions were also to know the satisfaction level of the existing customers on identified factors. The sample size was 500. The data was collected using judgment sampling by visiting educational institutions online.

#### **Secondary Data-**

The secondary data was collected from various reports, published material. Extensive literature has been reviewed from identifying the factors influencing the digital marketing tools for skill enhancement programs.

### **Data Analysis**

The analysis was made, and the following table 1 mentions the chi-square test performed between digital learning and digital tools for skill enhancement.

**Table 1: Opinion on digital learning platform \* Digital tool for skill enhancement Crosstabulation**

**Chi-Square Tests**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.870 <sup>a</sup>	6	.014
Likelihood Ratio	16.028	6	.014
Linear-by-Linear Association	2.676	1	.102
N of Valid Cases	500		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 19.01.

Table 1 shows a relationship between digital tools for skill enhancement and opinion on digital learning platforms. The organizations must work on various digital learning tools for enhancing the views on the media.

**Table 2: Customer Ratings on Digital Learning**

**Descriptive Statistics**

	Mean	Std. Deviation	Analysis N
Digital learning is easy to use.	3.608	.9799	500
Digital learning provides an opportunity to work during the Study	3.756	.9199	500
Digital learning helps in Physical distance /residence in remote areas	3.832	1.0909	500
Digital learning helps in Professional development & continued education	3.808	.9321	500
Digital learning helps in Family and other social obligations.	3.700	.8784	500
Digital learning educates a large number of student	3.920	1.0236	500
Interactive Collaboration among students is facilitated by digital learning	3.910	1.0237	500
Students work in small learning group thru digital learning	3.738	.8803	500
Developing students reflective digital learning & critical thinking	3.972	.9722	500
Digital learning Provides more flexibility	3.748	1.0032	500
To implement digital learning, careful planning is required	3.732	.9153	500
For using digital learning awareness, training is required.	3.802	.9944	500
Digital learning is relevant for many occupations in a broad range of sectors	3.846	1.0041	500
Digital learning helps in developing job-specific skills	3.930	1.0292	500
Digital learning can be used in some similar occupations and sectors	3.812	.9372	500
Digital learning might require additional training to be used in a new job or work environment.	3.93	1.027	500

**Factor Analysis**

The factor analysis is meant to extract the factors that impact digital learning skill enhancement programs. The calculated Cronbach alpha is 0.936, which shows that the data are reliable (refer to table 4). The table indicates that the approx chi-square value is 6345.563 with 120 degrees of freedom, which is adequate. Hence, it implies that there is a significant relationship between the variables in the population. The KMO value is 0.914. It verifies that the sample is appropriate for factor analysis. Both the results, that is, the KMO statistic and Bartlett's Test of



Sphericity, indicate a suitable factor analysis model. In the table, the output of factor analysis can be observed. It means 57.2 % of the total variation. The initial extraction was rotated, and two factors were extracted from 16 statements, which imply inter-correlations between digital learning and skill enhancement. Table 4 shows the factor matrix with factor loadings

**Table 3: Reliability of Data using Cronbach Alpha**

Cronbach's Alpha	N of Items
.936	25

**Table4: Factor Matrix**

Variables	Factor Loading	Factor Name	
Digital learning helps in Physical distance /residents in remote areas (A3). Digital learning educates a large number of students (A6). Digital learning helps in developing job-specific skills(A14)	.818 813	<b>Factor 1: Job-specific Skills</b>	
Digital learning might require additional training to be used in a new job or work environment (A16). Interactive Collaboration among students is facilitated by digital learning (A7). Developing student's reflective digital learning & critical thinking (A9).	.791 .789 .779		
Digital learning can be used in several similar occupations and sectors (A15). Digital learning helps in Professional development & continued education (A4). For using digital knowledge, awareness training is required (A12).	.773 .631		
Digital learning provides an opportunity to work while Study (A2).	.621 .584		
Digital learning helps in Family and other social obligations (A5).	.534 .515		
To implement digital learning, careful planning is required (A11). Digital learning provides more flexibility (A10). Digital learning is easy to use (A1). Digital learning is relevant for many occupations in a broad range of sectors (A13). Students work in small learning groups through digital education (A8).	.787 .680 .678 .545 .537		<b>Factor2: Flexible Learning</b>

### Discussion on Factors

Table 4 indicates that factors one and factor 2 contribute to influencing e-learning media for skill enhancement programs.

#### Factor 1: Job-Specific skills

From the study, Factor I with active factor loading suggests that students think that Digital learning helps in developing job-specific skills and can be used to educate a large number of students, including physical distance or residents from remote areas. Further digital education facilitates interactive Collaboration among students, which enhances reflective digital learning & critical thinking and can be used in several occupations and sectors. It is handy for professional development & continued education. Digital learning provides an opportunity to work while study and helps in balancing Family and other social obligations. It is noted that for using digital knowledge,

awareness training is required, and in the case of a new job or work environment, digital learning might require additional training.

**Factor2: Flexible Learning**

The second most crucial factor is careful planning. The study indicated that active digital learning requires careful planning. During preparation, it is apt to understand that most respondents prefer digital knowledge as flexibility in education exists, and it's convenient. The study concludes about the relevance of Digital learning for many occupations in a broad range of sectors. And students can work in small learning groups through digital learning.

The above study indicates that the institution's e-learning media has a significant impact on the development of skills accomplished by the center. The institution can give more emphasis to developing e-resources. This shows that institutions need to focus on the effective use of digital learning tools as an educational resource is not the only way institutions can succeed.

The following figure 2 shows the measurement model drawn using CFA with AMOS 21. The factors of job-specific skills and flexible learning have a significant impact on digital learning. The performance of digital learning platforms is determined by the factors derived in the study.

**Figure 2-Structural Model of Factors affecting Digital Learning**

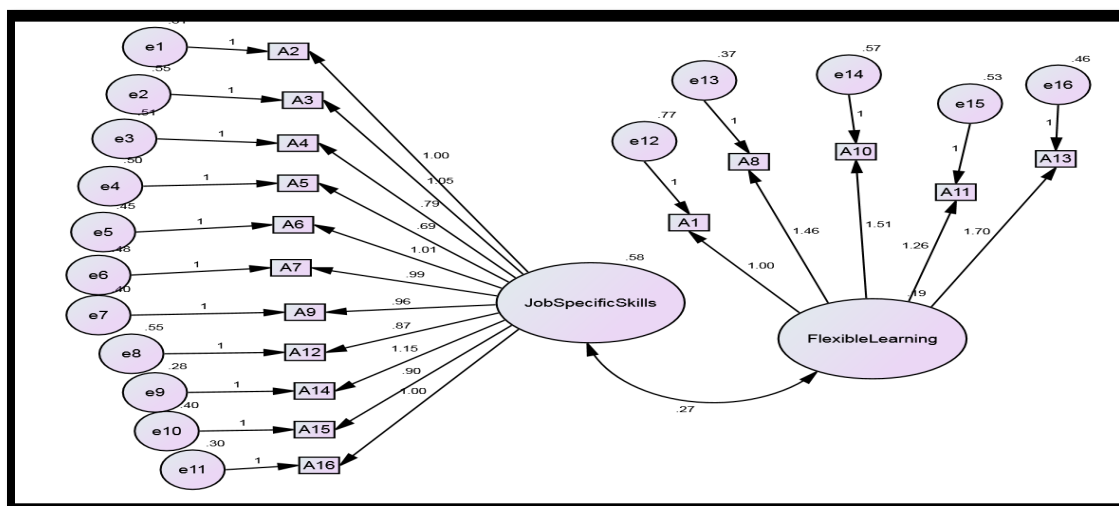


Figure 2 shows factor 1 with 11 items and factor 2 with five elements. The applied SEM also validates that the two factors are essential for enhancing the skill enhancement programs through digital media. Digital media adoption becomes convenient if flexible learning and job-specific skills are present.

**Table 5-Case Processing Summary**

		N	Marginal Percentage
Satisfacexistingofferings	Yes	129	25.8%
	No	113	22.6%
	Not Aware	258	51.6%
Valid		500	100.0%
Missing		0	
Total		500	
Subpopulation		308 <sup>a</sup>	

a. The dependent variable has only one value observed in 300 (97.4%) subpopulations.

**Table 6- Likelihood Ratio Tests**

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	793.516	64.357	2	.000
A1	736.112	6.954	2	.031
A2	730.650	1.491	2	.474
A3	737.958	8.800	2	.012
A4	730.175	1.016	2	.602
A5	731.791	2.633	2	.268
A6	733.897	4.739	2	.094
A7	730.826	1.668	2	.434
A8	734.984	5.825	2	.054
A9	745.042	15.883	2	.000
A10	734.873	5.715	2	.057
A11	736.775	7.617	2	.022
A12	731.668	2.510	2	.285
A13	749.967	20.809	2	.000
A14	730.158	.999	2	.607
A15	729.288	.129	2	.937
A16	730.551	1.392	2	.498

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

**Table 7- Parameter Estimates**

Satisfacexistngofferings <sup>a</sup>	B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
							Lower Bound	Upper Bound
Intercept	-4.851	.872	30.947	1	.000			
A1	-.027	.133	.040	1	.841	.974	.750	1.264
A2	.159	.185	.738	1	.390	1.172	.816	1.684
A3	.565	.199	8.089	1	.004	1.759	1.192	2.595
A4	.012	.193	.004	1	.951	1.012	.693	1.477
A5	.042	.175	.057	1	.812	1.043	.739	1.471
A6	-.216	.205	1.111	1	.292	.805	.539	1.204
A7	-.134	.201	.445	1	.505	.875	.590	1.296
A8	.229	.206	1.237	1	.266	1.257	.840	1.883
A9	-.227	.205	1.221	1	.269	.797	.533	1.192
A10	-.007	.147	.002	1	.962	.993	.744	1.325
A11	-.433	.173	6.236	1	.013	.649	.462	.911
A12	.158	.174	.826	1	.363	1.172	.833	1.648
A13	.768	.175	19.182	1	.000	2.156	1.529	3.040
A14	-1.220	1.210	1.016	1	.313	.295	.028	3.166
A15	-.019	.202	.009	1	.924	.981	.660	1.458
A16	1.400	1.205	1.348	1	.246	4.053	.382	43.039

	Intercept	-5.317	.865	37.791	1	.000			
	A1	.387	.162	5.699	1	.017	1.473	1.072	2.024
	A2	.182	.171	1.133	1	.287	1.199	.858	1.675
	A3	.187	.190	.967	1	.325	1.205	.831	1.748
	A4	-.177	.186	.902	1	.342	.838	.582	1.207
	A5	.323	.203	2.527	1	.112	1.381	.928	2.055
	A6	-.443	.210	4.435	1	.035	.642	.425	.970
No	A7	.182	.206	.786	1	.375	1.200	.802	1.796
	A8	.488	.209	5.435	1	.020	1.629	1.081	2.455
	A9	-.823	.216	14.528	1	.000	.439	.288	.670
	A10	.443	.199	4.972	1	.026	1.557	1.055	2.298
	A11	.058	.194	.088	1	.766	1.059	.725	1.549
	A12	.275	.185	2.213	1	.137	1.316	.916	1.891
	A13	.265	.195	1.848	1	.174	1.303	.890	1.909
	A14	.085	1.530	.003	1	.956	1.088	.054	21.833
	A15	.063	.205	.093	1	.760	1.065	.713	1.590
	A16	-.277	1.527	.033	1	.856	.758	.038	15.128

a. The reference category is: Not Aware.

Table 7 again validates the results extracted from the exploratory factor analysis. The structural model displayed in figure 1 is formulated on applying Confirmatory Factor analysis and shows the model of Digital Media learning and enhancement of skill enhancement programs through online media.

### Conclusion

The study has indicated that the development of job-specific skills is made possible by digital learning. The student portal is the best educational resource that may be used for developing skill enhancement courses in India. Cloud computing is the preferred digital tool for enhancing the efficiency of such a course. Most of the institutions in India are not providing enough platforms for their courses to be offered online. The student has an expectation from the institutions in their offering of existing classes online. Generally, digital learning is organized and managed at Faculty or department level in Indian institutions. The prime objective of most institutions is to increase current classroom time. There is a definite requirement for digital learning platforms for enhancing the teaching courses in Indian institutes or universities. Students are not much aware of institution placement records, and this finding is achieved in analyzing the responses. Facebook is the most preferred medium in social media from where the students get information about the institutes. The students are not aware of the offerings of the institution. The respondents have expectations from the institute that existing courses must be delivered online. The institution has to use online platforms for effective delivery. The study also suggests enhancing the effectiveness of digital learning. The organization's focus should be two-fold. Firstly, planning should be done with the utmost care and second flexibility.

Further, the state of managing digital learning by the institution is at the faculty/department level. It must be centralized. The institution has developed the educational resources as a student portal, but online delivery courses' effectiveness has to be enhanced.

### Managerial Implications

#### From Researcher Point of View

The study is expected to provide valuable insights into the causes of the lack of popularity. Study findings will help academicians offer the solution to educational institutes for adopting digital channels for their skill enhancement programs. The study may contribute to the existing literature on the subject in the area. The research will suggest the digital tools currently in use and proposes to be used by the organization. Further, the study will also reveal the institute's existing courses and future directions, which are in high demand.

### From Industry Point of View

Student's opinions on digital learning can be influenced if the industry is competent to provide the digital tools for skill enhancement courses.

### Limitations

The findings cannot be generalized as it is limited to Ghaziabad only. The study does not measure all possible interactions, and the students may use their textbook or communicate with their peers and instructor outside of the online course.

### Recommendations

The future business of the institutions will highly benefit from the findings of this project. As per the research conducted, the study has suggested that the company employ the digital tools currently in use like cloud computing, social media, etc. The institution must focus on digital media promotion as most students get information about their courses through this channel. The certification courses are quite popular among students, so the company must promote by using proper digital communication strategy. Further, the placements of the institutions are not known to the students. The company can work to increase the visibility of the same among the students. The institute's existing courses are popular among their students; the only discrepancy is a valuable digital tool for running their programs. The company's proper planning of digital marketing media for flexible learning needs to be developed for their skill enhancement programs.

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## ONLINE CLASSES EXPERIENCE AMONG STUDENTS DURING LOCKDOWN

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### ABSTRACT

As the economy is unfavourably influenced by Covid-19, education sector also got affected. Switching over from offline to online education during the lockdown period was undoubtedly for the first time in India to experiment with the education system. No one thought that the classes would be delivered online. The purpose of the study was to understand the experience of online classes among students during lockdown and to know their satisfaction level during online classes. The data have been collected through a questionnaire filled from 128 respondents of the National Capital Region (NCR). The study was conducted during May to July 2020. Random sampling method was used to select the respondents. The collected data were analysed using descriptive statistics. It was found that the majority of the students agree that online classes are convenient, but it is not interactive. Some of them feel that attention is not given to students in online classes as compared to the real classroom. They do not want to continue with online classes after the pandemic. Students are not satisfied with online classes. It is recommended that the teaching pedagogy needs to be changed for online classes. It should be made sure that students are engaged during classes and more attention should be given to the students.

**Keywords:** COVID 19, Lockdown, Learning, Students Experience.

### Introduction

As the economy is unfavourably influenced because of Covid-19, the education sector also got affected (Shimpi, 2020). During mid-March 2020, the students were asked to stay home due to the outbreak of COVID-19. Then the academic institutions had no option but to start with the online classes (Kanodia, 2020). There were more changes in the academic world as it was confined to classrooms, which is not possible now. It was ensured that learning is being provided to students (Sharma, 2020). The switching over from offline to online education during the lockdown period was undoubtedly for the first time in India to experiment with the education system (Kumar, 2020). No one thought that the classes would be delivered online. According to a survey, most of the students are not satisfied with online classes (Lalit, 2020). As per a study, 90 lakh government college students do not have access to online classes due to connectivity issues and unavailability of electricity (Sharma, 2020). Online classes cannot compensate entirely, but it can supplement the real classroom learning, else the learning would have stopped. Various initiatives were taken by the government, *i.e.*, MHRD, NCERT, AICTE and others regulators to help the students and faculties like MOOC, SWAYAM, National Digital Library, e-PG Pathashala, *etc.* The educational institutions are adjusting to the digital education as they haven't used it before (Kumar, 2020). Educational institutes are impacted due to the pandemic in number of ways like there is delay in the start of the new semester, examinations are either postponed or not conducted, *etc.* After conducting online classes for two weeks, it was decided to analyse the experience of students towards online classes. The purpose of the study was to understand the experience of online classes during lockdown and to know the satisfaction level of students during online classes.

### Literature Review

Seoud et al (2014) studied the impact of e-learning on higher educational institutes. The data were collected from 124 students and recommended that faculties must change the teaching techniques while teaching through online mode. Sun & Chen (2016) discovered that online education is likely to grow. The researchers recommended that it is very important that the education should be student-centric. Pande (2018) conducted a survey of 283 students of Uttarakhand Open University and found that the students are satisfied with mobile learning. Pollock & Bataineh (2018) analyzed the perception of students and teachers towards the technology and discovered that there is an increase in engagement of students in classes due to the use of technology. Chandrasekaran *et al.* (2019) collected data from 250 students and revealed that there is a significant effect on youngsters' buying behaviour due to online learning. Devi & Panneerselvam (2019) studied the satisfaction level of users towards e-learning resources and analyzed the data by using factor analysis. It was found that the main element affecting the user's satisfaction is content quality. Dwivedi *et al.* (2019) analyzed the behaviour of 152 post graduate students and found that the students' engagement increases when the online material is related to the syllabus. Edumadze *et al.* (2019) analyzed the perception of students towards mobile learning in Ghana. The data were collected from 600 undergraduate students and discovered that the majority of the students professed that it was easy to access the

material notes through the mobile. Abbasi et al. (2020) studied the perception of students towards e-learning. The data were collected from 382 medical students and found that the majority of the students do not prefer e-learning. Ahmad & Rahi (2020) surveyed 240 students and discovered that students are in favour of online classes during the pandemic. Goplani & Gupta (2020) concluded that the students should actively participate in online lectures. Jadhav (2020) found that students are not able to focus on studies due to lockdown. Maurya *et al.* (2020) discovered that there is a positive attitude of students towards e-learning. Mogaji and Jain (2020) highlighted that internet connectivity is the main issue in digital learning. Muthuprasad *et al.* (2020) collected data from 307 students and found that online classes have a positive impact on the students. The students feel that online learning has various benefits like flexibility, convenience, comfortable, *etc.* Nachimuthu (2020) collected data from 130 students and revealed that students have a positive attitude towards e-learning. Sreehari (2020) collected data from 88 students and discovered that students are less engaged in online classes as compared to offline classes as there are internet issues. Bhowmik and Bhattacharya (2021) collected data from 94 students and employed tools like independent samples t-test, one way ANOVA and confirmatory factor analysis. The researchers discovered that institutional and teacher related factors are highly correlated and lack of interaction and feedback impacts online learning. Mensah *et al.* (2021) surveyed 2,115 students of Ghana and analyzed the data using correlation and regression analysis. The study found that the student-teacher interaction is correlated with the effectiveness of course, students' learning behaviour and skills.

### Research Objectives

1. To analyse the experience of online classes among students during lockdown.
2. To know their satisfaction level during online classes.

### Methodology

The population for the present study is all students attending online classes in India, but for the present study, NCR was selected. The data have been collected through primary and secondary sources. For primary data, a questionnaire was prepared using a five-point Likert scale *i.e.* Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D) and Strongly Disagree (SD). An online survey was done to collect the data from the students. The study was conducted during May to July 2020. Google form was sent to 201 respondents, but only 128 respondents filled the survey. The response rate was 63 percent. A Random sampling method was used to select the respondents. The collected data were analysed using descriptive statistics.

### Reliability of Scale

The reliability of the questionnaire was checked by Cronbach's Alpha Coefficient and the value is 0.813. Any value of 0.70 and above is a good measure of internal consistency.

### Results and Discussions

Table 1 shows the sample profile of the respondents. Out of 128 respondents, there were 61 boys and 67 girls. Nearly 40.6 percent were in the age group of 15 to 18 years, 49.2 percent were in the age group of 19 to 21 years and 10.1 percent were more than 21 years old. 32 percent respondents were under graduate, 38.2 percent were graduate and 29.6 percent were post graduate.

**Table-1: Sample profile**

Demographic	Characteristics	Frequency	%
Gender	Male	61	47.6
	Female	67	52.3
Age	15-18	52	40.6
	19-21	63	49.2
	More than 21	13	10.1
Qualification	Under Graduate	41	32
	Graduate	49	38.2
	Post Graduate	38	29.6

**Source: Primary Survey**



Do you think you have sufficient access to equipments (laptop/desktop) to effectively shift to online classes

213 responses

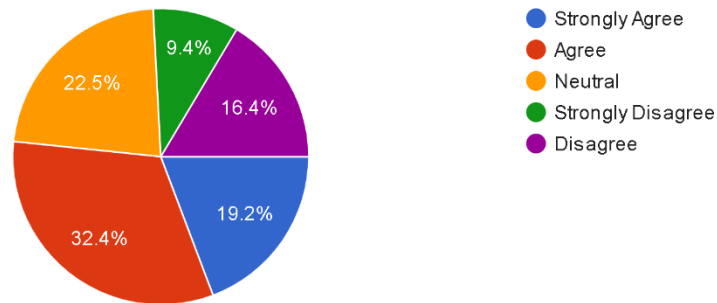


Figure-1 shows that the majority of the students (51.6 percent) agreed that they have access to laptop/desktop/mobile phones to attend online classes while 25.8 percent do not have access to equipment to attend online classes. It seems that most of the students did not get any problem in attending online classes. Students have digital access to support their learning.

Are online classes convenient?

213 responses

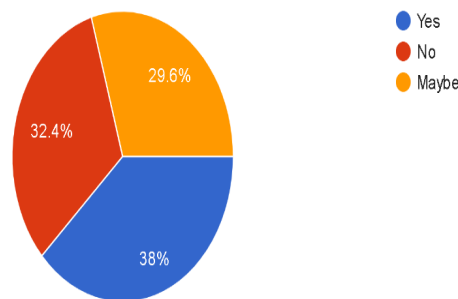


Figure-2 shows that the majority of the students (38 percent) agreed that online classes are convenient as they can sit at home and attend the classes. The result is consistent with the study of Muthuprasad *et al.* (2020).

Do you think online classes are more interactive?

213 responses

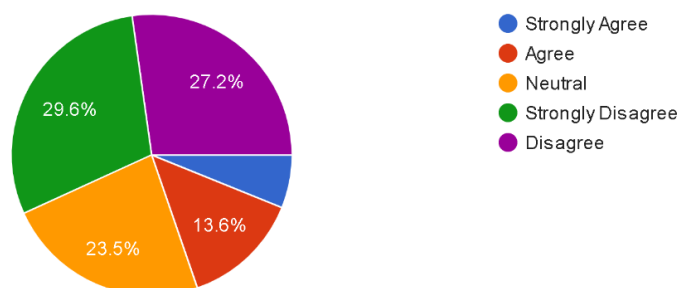


Figure-3 shows that the majority of the students (56.8 percent) think that online classes are not interactive. They agreed that setting interaction in the real classroom is more important as compared to the virtual classroom. The classroom offers unlimited opportunities to involve students. The result is consistent with the study of Muthuprasad *et al.* (2020).

Do you think more attention is given to students during online classes?

213 responses

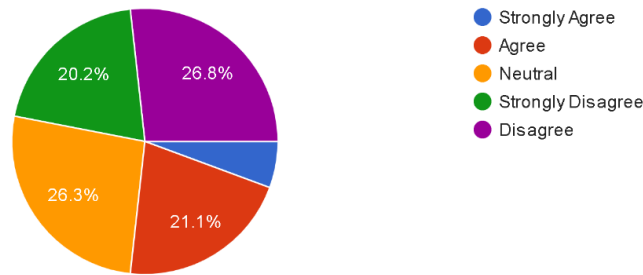


Figure-4 shows that the majority of the students (47 percent) think that attention was not given to students during online classes as compared to the physical classroom. The result is consistent with the studies of Li & Lalani (2020) and Sreehari (2020).

Do you feel there is better concentration during online classes

213 responses

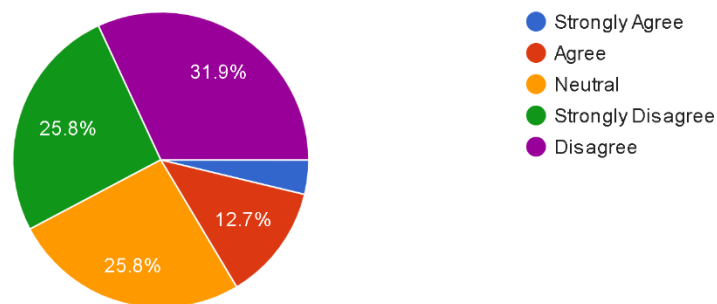


Figure-5 shows that the majority of the students (57.7 percent) felt that they cannot concentrate as much in online classes as compared to a physical classroom.

I think online classes under COVID'19, has changed the quantum of material I learn.

213 responses

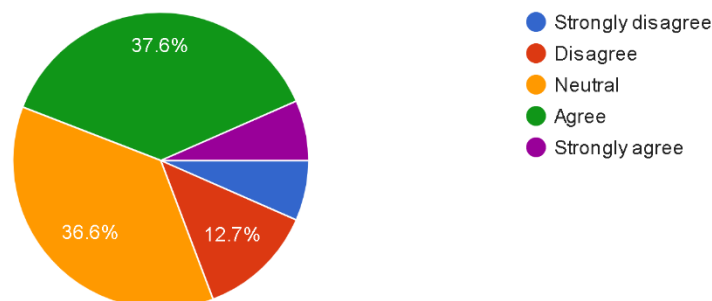


Figure-6 shows that the majority of the students (37.6 percent) agreed that online classes have changed the quantum of material that they learn. It was in line with the findings of Muthuprasad *et al.* (2020).

Do you face problems in numerical subjects during online classes?

213 responses

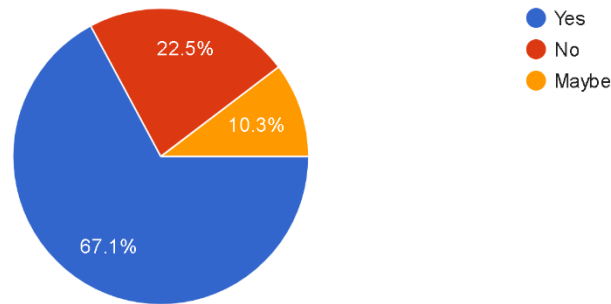


Figure-7 shows that the majority of the students (67.1 percent) faced problems in various numerical subjects like accounting, mathematics, statistics, *etc.* during online classes as compared to a physical classroom.

My overall learning got better due to online classes in COVID'19

213 responses

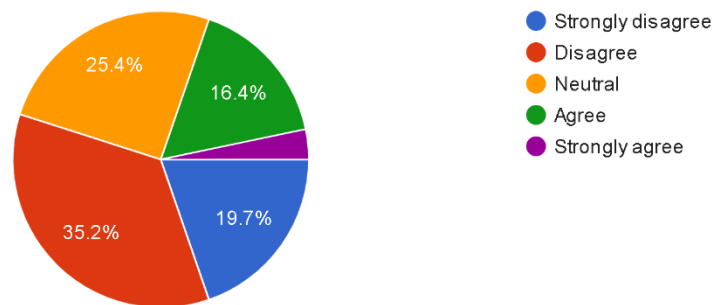


Figure-8 shows that the majority of the students (54.9 percent) think that there is no impact of online classes on their learning. The result is consistent with the study by Sreehari (2020).

Do you think online classes should continue even after pandemic is over?

213 responses

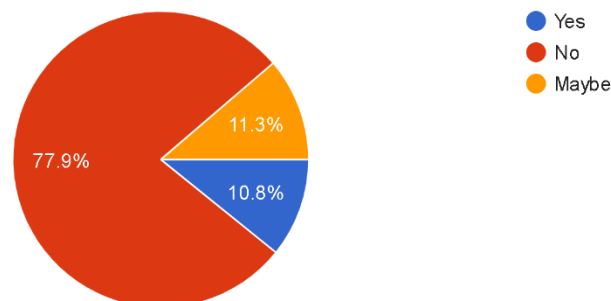


Figure-9 shows that the majority of the students (77.9 percent) do not want to continue with online classes after the pandemic. They are comfortable in attending classes in a physical classroom. There are various reasons for it like most of the students faced connectivity issues. They think that no attention is paid to them in online classes and they think that online classes are less interactive. The result is consistent with the findings of Sreehari (2020), Abbasi et al. (2020) and Ahmad & Rahi (2020).

Are you satisfied with online classes ?

213 responses

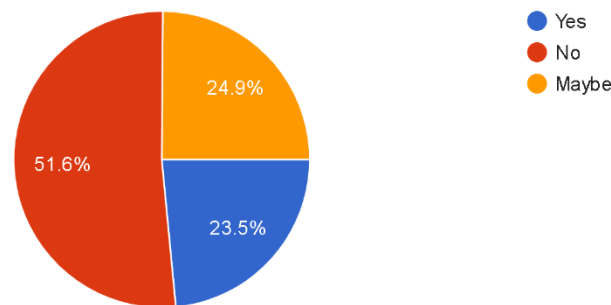


Figure-10 shows that the majority of the students (51.6 percent) are not satisfied with online classes. The result is consistent with the study of Gaur et al (2020).

### Conclusion and Recommendations

No doubt, virtual classes cannot replace the real classroom education, but it can be used as a supplement to the real classroom. There is a need to face-lift the current teaching methods so that online learning can be effortlessly assimilated into mainstream education. The educational institutes have to reshape and restructure (Sun & Chen, 2016). Majority of the students (51.6 percent) agree that they have access to a laptop/desktop/mobile phones to attend online classes. Majority of the students (38 percent) agree that online classes are convenient, but it is not interactive. Some of them feel that attention is not given to students in online classes as compared to the real classroom. Some even felt they could not concentrate as much in online classes. As expected, students faced problems in various numerical subjects. They do not want to continue with online classes after the pandemic. Students are not satisfied with online classes. It was discovered that there is more attendance of students during online classes.

The teaching pedagogy needs to be changed for online classes. It should be made sure that students are engaged during classes or activities. More attention should be given to students. The problems faced by the students must be tried to remove so that they get more engaged during online classes. The government must make sure that the internet facility should be available to all the corners of the country so that no student faces connectivity issues during online classes. The digital India initiative by the government is a step which is helping towards e-learning.

### Implications of the Study

The study will be useful for the students and faculties to know the benefits and challenges of online education. The educational institutes may implement the suggestions to improve online education.

### Limitations and Further Scope of Research

The study was limited to NCR, so the results may not be applicable to the whole nation. The sample size was small, so the results may not be generalized. The present study was limited to descriptive statistics. Future studies may be conducted by using various statistical tests like t-test, ANOVA, factor analysis, etc. Further studies may be conducted empirically to examine the impact of online education on mental status of students, impact of online education on their performance, etc.

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## PERCEPTION OF STUDENTS AT HIGHER EDUCATION INSTITUTIONS TOWARDS ONLINE ASSESSMENT: AN EXPLORATORY STUDY

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### ABSTRACT

Assessment is an essential piece of the teaching-learning puzzle. Since decades, there has been a tussle between which modes of assessment, traditional or online would best meet the goal of learner's evaluation. By the 21<sup>st</sup> century, blended mode of assessment had already made its foot in the door for many educational institutions. However, it was the pandemic which tilted the scale globally towards the online methods of evaluation and assessment. This paper attempts to explore how students perceive the online assessment, they have been subjected to. The data was collected through an online survey conducted in the month of October. 120 students between the age group of 18-23 years studying in higher education institutes in Delhi (Undergraduates and Post Graduates) participated in this study. The sample was purposive as the responses from only those who had been asked to undergo online assessment during the pandemic were selected. The simple percentage distribution was used to analyze the information provided by the participants. The results highlighted apprehensions of students while they are being assessed online. It also shares insight about the traditional modes of assessment as well as the opinion of students regarding the digitalization of education. These results would help us in recognizing the hurdles and discovering the positives of online assessment.

**Keywords:** Assessment, Traditional, Online assessment, Technology.

### 1. INTRODUCTION

Assessment is a reflective process that comprise systematic gathering of data, organising it in an orderly manner, thus making it easier and open for interpretation. Learning and teaching activity are incomplete without assessment. It helps in shaping the instructional decisions to be carried on everyday basis and also manages to point out the gaps in classroom instruction along with areas of potential. Students obtain precise feedback to maintain and excel learning. Assessment tools are even needed by teachers to shape their teaching pedagogies to accord the learning styles the students (Pierce, 2020).

Being an invariable part of all curriculums, assessment methods have evolved along time. Traditional methods of assessments were linear, teacher centric, paper pencil based. Over the last few decades, blended and purely online methods of teaching and assessment have rapidly taken over the educational scenario. India along with its global counterparts has taken multiple initiatives to welcome the e-revolution into the field of education. According to a report by KPMG and Google, the factors that have accelerated the growth of e-learning in India are growth in Internet and smart phones penetration, low cost of online education, traditional model failing to fulfil demands and the digital friendly government policies (Bansal, 2017). Recently the pandemic shift along with the National Education Policy 2020 has also tilted the bars towards online and digitalization of education in our country. The new policy recognises the advantages of technology and address the issue of digital divide by extending its outreach. According to the policy, 'assessment frameworks encompassing design of competencies, portfolio, rubrics, standardized assessments, and assessment analytics will be created for online assessment and examinations. Studies will be undertaken to pilot new ways of assessment using education technologies focusing on 21st century skills', (NEP, 2020).

One of the merits of online assessment methods is that they provide the facilitator an extensive array of techniques to gauge the performance of the students. Virtual discussion boards, concept mapping, individual projects, group activities, e-portfolio assessment, peer assessment, student feedback and self evaluation are multiple ways of harnessing the benefits of online methods (Benson, 2003; Reeves, 2000). However with plethora of positives, there are certain challenges of this digital pathway. In an article by Sunil Kumar in 2015, adaptability struggle, technical issues, computer literacy, time management and self motivation were cited as the five basic challenges a learner faces while being assessed online. Also during this technology driven assessment the instructors too need a sound technical knowhow and resources as well as time to plan the instructions. There are several classifications for assessment based on different parameters (Table 1.1).

The table 1.1 highlights the major difference observed between traditional, online and blended means of assessment.

Characteristic	Traditional Assessment	Online Assessment	Blended Assessment
Mode	Face to Face	Online	Combination of face to face along with ICT driven methods
Infrastructural Aid	Paper Pencil	Digital Equipments – Computers and smart phones	Amalgamation of traditional and digital aids
Tools and Techniques	Less options are available	Variety of online applications can be gauged	Variety of offline and online methods can be explored
Academic Honesty	Can be assured	Difficult to judge	Can be assured
Time	Time taking as it is done manually	Saves time as it can be mechanically achieved	Time can be managed well
Discussion/Feedback	Delayed but direct	Immediate but indirect	Sufficient feedback can be provided

Therefore, there is no magic route towards attaining digitalization and incorporation of ICT in education and assessment. There are pros and cons to both types of assessment methods. A balanced approach between traditional and online assessment is the key. While deciding what assessment techniques to be employed, the instructors need to understand the content and context of the audience. Hence, a blend of both assessment techniques might be useful (Dikli, 2003).

## 2. This Study

To gauge the success of any learning instruction, robust assessment measures are the key component. Assessment not only provides information about what the students have learned (Summative Function) but also explains how well they have aced it (Formative Function) or what are the gaps that demand attention (Diagnostic Function). For an optimal teaching-learning environment, it is imperative to design and keep the assessment methods in consonance with the teaching-learning processes. With alterations induced in the educational scenario by the Covid-19 pandemic and the onset of lock down, it was imperative to assess the perspective of students regarding the online assessment. Certain research questions addressed in this study were:

- What kind of online methods and assessment techniques was being used by the education institutes?
- Do ICT skills help a student with their online assessment?
- Are online assessment methods a fair measure of an individual's ability?
- How do students feel about the traditional methods of assessment?
- Is health affected due to online assessment?

## 3. Methodology

### 3.1 Method

The descriptive survey design was utilized to describe various aspects of the online assessment. The researchers chose this design to understand the phenomenon from the perspective of students who had undergone the online assessment mode in recent times. The main objective was to gain a standpoint regarding the issues related with online assessment, its accessibility, and feasibility among the learners.

### 3.2 Participants

The criteria of inclusion for this study were based on two factors, firstly the participant should be a student enrolled in an ongoing higher education program that is they should be pursuing their graduate, post-graduate or some professional degree program. Secondly, the participant must have participated in the online mode of assessment to be considered as the sample for this study. Therefore a sample of 120 learners was chosen using a purposive sampling technique.



Table 1.2 Demographic profile of the participants (n=120)

Stream	Number	Percentage	Course	Number	Percentage
Social Science	27	22.5 %	Graduates	65	54.2%
Science	67	55.8%	Post Graduates	46	38.3%
Commerce	14	11.7%	Other Courses	9	7.5%
Professional Courses	12	10%			

### 3.3 Measure

The survey was designed and constructed after a thorough examination of the literature available on the topic. This questionnaire included seventeen closed-ended questions. The initial questions were framed to understand the demographic profile of the participant and to ensure if the participant is acquainted with the online methods of assessment. The remaining questions were based on the issues and challenges they may have experienced with the online mode of assessment.

### 3.4 Data Collection and Analysis

Due to the pandemic, the most efficient approach to administer this survey was through email using a Google form. The survey was conducted in the month of September, assuming that most of the participants must have been through their assessment for the previous semester. The form was sent to more than 200 participants and 140 responses were received. As the sampling was purposive, forms with redundant information were discarded, thus reducing the number of participants to 120.

The raw data in form of filled questionnaires were collected from the participants. The responses were electronically transferred from the questionnaires into an excel spreadsheet. Each question number was put under a column heading and one row was used for each participant's responses. Once all the data from the questionnaires were entered into the spreadsheet, it was checked for accuracy and the errors were rectified. The researchers then with the help of Microsoft excel 2009 calculated how many people selected each response and displayed the final data using tables and graphical representations.

## 4. Result and Discussion

### 4.1 Online Assessment Techniques

Table 4.1 Common Online Assessment Methods

Assessment Method	Number of Participants	Percentage
OBE – Open Book Examination	61	50.8%
Viva Voice through video Conferencing	75	62.5%
Google Forms/Multiple Choice Questions	94	78.34%
Quizzes	63	52.5%
Online Assignments/Essay type Questions	100	100%
Practical work	04	3.33%

All 120 participants had attempted one or the other form of online assessment either as assignments or as exams during the recent pandemic induced lockdown. Online assignments in form of PowerPoint presentations, video making, or drafting word documents were taken up by all the respondents. A large number had experienced filling up the Google forms in form of quizzes and multiple-choice questions. More than half of the respondents had attempted the open book and three-fourth of the sample had attempted the viva voice examinations online. The least attempted or assigned item was practical work (3.4%). Thus, we can clearly point out that taking upon practical work would still be a challenge in these times of virtual teaching. Also, the quality and result of assigned work would largely depend on the manner and the context in which the instructor has framed it. Some studies support that online tests with multiple-choice questions stimulate surface learning while online assessment in a form of an essay stimulates deep learning (Zlatović et al., 2015). Assessment based on problem-based learning, valid learning tasks, and real-life studies is marked powerful as they evaluate students' ability to merge learning across different domains of knowledge and capabilities that are required in a "volatile and rapidly transforming world" (Scott, 2016).

Only one-fourth of the participants (n=30) were acquainted with online tasks before the pandemic. While 35% (n=42) were never asked to submit any of their work through the online mode before the imposed lockdown. 40%

of participants (n=48) were following a blended mode of assessment, wherein they were asked to submit their work offline as well as online. Hence, we can conclude that the pandemic has shifted both learning and assessment towards the online mode.

The data clearly showed that 60% of participants (n=73) did not receive any kind of training or assistance from their institutions/colleges before they were asked to adapt to the online mode of assessment while 47 participants confirmed that they did receive training towards the online mode of assessment and submissions from their alma mater. Training and hand holding is definitely required at this time when the online medium has been pushed hard into the lives of the students. Guiding them towards the changed system will reap better results as compared to lack of training which could significantly reduce the expectations students could have towards the online learning (Kim & Bonk, 2006).

#### 4.2 ICT Competency

Table 4.2 Impact of Computer Literacy/Skills

ICT skills help in scoring better	Number of Participants	Percentage
Yes	48	40%
No	17	14.2%
Output remains same	55	45.8%

More than half of the participants said that the output over an assignment would remain the same for a student even if she/he has excellent ICT skills. However, a large number of participants (n=48) differ and confirmed that an individual's ICT skills would positively affect their performance output. Students with different knowledge, skill set, and confidence levels while using digital platforms may affect their educational outcomes and assessment, therefore students need to be given some preparation so that they are not at loss due to the technology or procedures employed (Stödberg, 2012).

When asked if they feel their computer literacy was sufficient for their attempts toward online submissions, 60.8% (n=72) confirmed positively by choosing they were proficient. However, 31.7% of participants said they have somehow managed the task while 8 participants held that they were still struggling with the process. It is, therefore, important that the learners are well prepared towards the medium of their assessment as this would directly impact their performance and grades (Gewertz 2013).

Table 4.3 Fairness in online assessments

Judging capabilities through Online Assessment	Number of Participants	Percentage
Fair	31	25.8%
Unfair	38	31.7%
Can't decide	51	42.5%

Thirty-one participants agreed with the online mode of assessment being fair and justified. On the other hand, more than one-fourth of the participants felt it was unfair to judge one's capabilities based on their performance online. There were about 42.5% of participants who were unsure about assessing an individual's potential based on their submissions made online. There are multiple factors involved when an individual is assessed over his/her online submissions. Comprehensibility of content, poor connectivity, lack of technical support, proper guidance, and support materials for their online learning can digress the performance output in many cases (Hasan & Khan, 2020). Also, using unfair means during an online test is not a new phenomenon. Researchers point out several ways that students use while attempting online tests do often come under cheating. This could include participants taking these tests as an open book exercise or using many computers at one time for looking for fast answers (Harmon, Lambrinos, & Buffolino, 2010; Fontaine, 2012).

#### 4.3 Traditional Methods

Table 4.4 Preferred mode of assessment

Mode of Assessment	Number of Participants	Percentage
Online	6	5%
Traditional	18	15%
Blended	96	80%

The majority of the participants felt that they will be most comfortable with the blended model comprising both, the traditional and the online methods of assessments. However, few participants confirmed that their comfort zone lies within the traditional paradigm of assessment and even a smaller sample (5%) sample shared that they found the online methods, convenient and student-friendly. All the methods have their pros and cons and effective

assessment demands a balanced approach. On one hand, it is proven that the technology-based assessment provides an enriching and interactive environment to the learner than the paper-pencil based methods (McKenna and Bull, 2000; Daziel and Gazzard, 1999). Such spaces of learning are imperative for harnessing the higher-order knowledge and skills among the students. While on the other hand, we cannot let machines overtake the humane aspect associated with learning. Studies have confirmed that when auto-generated feedbacks without personal inputs are provided, they may affect the learners negatively (Craven et al. 1991). A study conducted by Khan and Khan (2019) corroborates that participants felt a disconnect between them and the instructors. The reasons cited were the absence of face to face interaction with the instructor, lack of qualitative feedback, and also at times common feedback to all (Khan and Khan, 2019). It is evident from this study that a large number of participants viewed the blended mode of assessment as the best medium.

#### 4.4 Digitalization of Assessment Practices

Table 4.5 Digitalization of Assessment Practices

Is Digitalization, the future?	Number of Participants	Percentage
Agree	71	
Disagree	20	16.7%
Unsure	29	24.2%

A large number of participants (n=71) believed that the digitalization of education and online mode of assessment will be the future of the Indian education system yet 16.7 % of participants (n= 20) disagreed. A considerable portion of about 24.2% of the participants was unsure about these changes altering the framework of our education system. Additional data regarding their perspective and willingness to continue with the changed mode of assessment substantiates the above finding. When contemplated, if the participants would like to continue with online assessment methods even after the pandemic, 20.8% (n=25) agreed while 24.2% (n=29) disagreed. More than half of the participants (n=66, 55%) agreed with a blended model approach. The participants prefer an amalgamation of technology and the face to face conventional style of assessment than complete dependency on either of the two modes. These unprecedented times may have fastened the wheel when it comes to the online methods, but it has also provided the much-needed momentum towards the goal of digitalizing education. There is no second opinion that to be able to successfully achieve it, we must combine the online (virtual) and offline (F2F) modes of education. The blended or flipped approach towards education will be able to balance between e-education and traditional systems (Palvia et al., 2018).

#### 4.5 Effect on Health

Table 4.6 Dominant feeling while being assessed online

Feelings	Number of Participants	Percentage
Comfortable	45	37.5%
Anxious	31	25.8%
Motivated	3	2.5%
Unsure/confused	31	25.8%
Positive	10	8.3

When enquired about their feeling towards getting assessed online, 37.5% of participants said they were comfortable with this process whereas a large number of participants corroborated that they felt anxious (n=31) and unsure (n=31) about this mode of assessment. Few participants were positive (n=10) and motivated (n=3).

When enquired, a large number of respondents (65.8%) did look at the online methods of assessment as an opportunity to learn something new. However, there were considerable responses that have marked these methods as challenging (40.8%) and burdensome (36.7%). An almost equal number of participants had found this mode of assessment as time-consuming (26.7%) as well as time-saving (28.3%). New methods of assessment would bring a lot of challenges and how an individual looks at them would depend on the external and internal factors towards learning. Therefore, it is essential to provide technical training along with easy accessibility to the infrastructural demands like the device and internet connection the online mode would demand an error-free experience for the learner.

Table 4.7 Impact of Online Assessment on Health

Do Online assessments affect health?	Number of Participants	Percentage
Yes	60	50%
No	12	10%
To a certain extent	48	40%

Only 10% of respondents felt that online work and submissions had no ill effects when it comes to the mental and physical aspects of health. However strikingly half of the respondents 50% (n=60) believed that this mode of assessment may hamper their health and another 40% agreed with them to a certain extent. When enquired about the reasons behind the health issues associated with online assessments, participants had multiple explanations. Almost 90% of participants held the increased screen time a potential factor related to deterioration in health. While 70% of the sample believed, less social interaction and sitting in one place for longer durations is another viable reason to be responsible for ill-health factors. Anxiety, Internet being distractions itself, delayed feedbacks associated with online assessment were few other factors pointed out. The findings of this study were similar to a study conducted with 240 Romanian students regarding their acceptance of online assessment. It was observed that online summative assessments were associated with anxiety regarding several factors such as if the test had been submitted in the correct manner, or if responses got distorted due to technical errors (Kuriakose and Luwes 2016)

### 5. Suggestions

The samples for the present study were drawn from an urban metropolitan city, rather than the wider population. The impact of this could have been biased in terms of not collecting a representative view of the population, especially students from rural areas. Based on the findings of this study, researchers and policy makers can take apt steps by formulating policies, programs and campaigns for reducing the digital divide and making it assessable for the masses.

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## PERFORMANCE CRITIQUE FROM THE PERSPECTIVE OF THE RURAL AREA USING DATA MINING ALGORITHMS

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### ABSTRACT

Advanced education has accomplished the most extreme need as it assumes a basic part of the socio-economic development of the nation. The objective of the administration is to deliver an instructive domain with Knowledge, Skills, Desired Values, Innovations. The measures are adopted to expand the number of educational foundations with the goal that no youngster is deserted in gaining instruction. But, there still exists a provincial divergence in the Indian Education System. A gigantic hole has been made in metropolitan and provincial region instructive foundations. The state governments are attempting their level best to minimize the gap by opening the number of instructive foundations of the most extreme quality in a rustic region so training ought to be uninhibitedly accessible at the doorsteps. This paper manages to take a contextual analysis of a rustic zone instructive establishment that assesses the exhibition of the understudies in a graduation course and targets perceiving the most persuasive credits that influence the performance. It additionally examines the explanations behind the dropouts and discovers the timeline when the dropouts are greatest. This is accomplished by applying various classification algorithms to the dataset. It establishes that the Multi-Layer Perceptron Model outstands all by accomplishing 100% precision and Kappa Statistics estimation of 1.

### INTRODUCTION

Basic education in India manages the four essential issues of quality, access, equity, excellence. Whereas, Access and Equality are the difficulties to be gone through if higher education has to be uplifted. To address these issues it gets important to open organizations for advanced education in educationally restricted regions. Taking the scenario of Punjab, after its revamping in 1966, the legislature has made very much arranged procedures to create and extend educational facilities. These timely endeavors have prompted the opening of numerous colleges, universities, and schools territory-wise. As a significant activity to support training, different colleges have likewise evolved local grounds in rustic territories with the goal that education can be reached at the doorsteps of the students living in faraway spots. In recent years industries have emerged in Punjab and are the main source for providing job opportunities to both technical and non-technical manpower. To close the gap, the technical education and industrial training systems have been expanded, modernized, and reoriented.

Taking a case study of a rural area regional campus developed by the state government university near Sultanpur Lodhi. This university campus has been set up in 2014 for providing educational facilities to the economically and educationally poor sections of the society. Most of the population belonging to this area is Scheduled Castes (SC). The governments have put up many efforts to help these weaker sections by proposing various welfare schemes for them like Post Matric Scholarship Schemes for SC/ST in which no fee is charged from this section and even book banks free of cost and other facilities are provided. This study deals insight into why the university regional campuses are not doing fairly good even though these campuses are providing high-quality infrastructure, well-qualified faculty coming through selection criteria, well-equipped laboratories housing research and project labs separately, concessions and scholarships given to the needy and brilliant students, welfare schemes for SC Students and minority class, different departments for youth welfare and sports. This paper considers students enrolled in one of the courses offered on this rural area campus, and uses data mining techniques to forecast student success, analyze dropout rates, and compare school-level performance to college-level performance in examinations. And attempting to deduce the reasons for it.

This paper addresses the following research questions:

R1: How accurately the performance of the students in a graduation course in rural areas can be measured?

R2: To analyze the most influential attributes that affect the performance of the students.

R3: To evaluate the time duration when the dropout rates are at a peak level.

WEKA 3.8.1, an open-source data mining tool, was used to answer these research questions. The data sets for the students enrolled in a 3-year graduation course have been taken as input. The data sets consist of three years. The input data is firstly pre-processed by applying various filters and then data mining algorithms are tested like Naïve Bayes, J48, ZeroR, MLP, Simple CART. For performance enhancement, various ensemble algorithms as Bagging, Voting, and Stacking are used. The accuracy, Kappa statistics, Mean Absolute Error, and Relative Mean Squared Error, among other parameters, are used to test the results.

The following is a breakdown of the paper's structure:

Section II provides an overview of relevant educational data mining research.

Section III describes the research analysis, as well as the technique used and the output parameters considered.

Section IV analyses the results from the experimental setup.

Section V gives the conclusions and future work.

## LITERATURE SURVEY

Ibrahim et al. use the Cumulative Grade Point Average to measure academic success using three classification models: Artificial Neural Networks (ANN), Decision Trees, and Linear Regression Model (CGPA). It shows that ANN has the highest level of accuracy, (Ibrahim & Rusli, 2007)

Quadri et.al. finds the dropout rate of the students by choosing the decision trees technique which performs the best. (Quadri & Kalyankar, 2010).

For measuring academic results, Ali et al. use both dependent variables (like grades) and independent variables (like age, economic status, education, and so on). Three models were used: Linear Regression Model, Correlation Analysis, and Descriptive Analysis, with the linear model proving to be the most efficient (Ali et al., 2013).

Radaideh et.al. uses a decision tree technique to find which attributes affect the most while measuring academic performance. (Andrew Braunstein, Michael McGrath, 2015)

Affendey et.al. uses Naive Bayes, AODE, and RBF Network for ranking of the courses that contribute to academic performance. (Affendey et al., 2010)

Baradwaj et.al. uses the Decision Tree Technique for predicting student performance. (Kumar & Pal, 2011)

In a Credit Based Continuous Evaluation System, Kaur et. al. use boosting algorithms to improve the performance of classification algorithms for early estimation of the student's marks in Major Tests (CBCES) (Kaur & Kaur, 2016)

EIGamal et.al. uses the decision tree technique for identifying the variables that predict student programming performance. (F.EIGamal, 2013)

According to Asif et al., graduation performance can be predicted using pre-university marks and 1st and 2nd-year marks without taking into account any socio-economic or demographic factors, and the results show that Naive Bayes performs the highest. (Asif et al., 2014)

Kovacic et al. use classification trees to work out how enrolment data will help determine who will succeed and who will fail. With a 60.5 percent classification score, the Classification and Regression Tree Model provided the best prediction. (J. Kovacic, 2010)

For the first year of study, Oancea et al. use neural networks to predict students' grades based on their grade point average. (Oancea et al., 2017)

Hardre et.al uses AMOS 4.0 to investigate the predictive relationship among student characteristics that influence motivation for learning and achievement. (Hardré et al., 2007)

Daud et.al. uses Bayes Network, Naive Bayes, C4.5, and Cart to measure academic performance by taking student personal information and family expenditure as attributes. (Daud et al., 2019)

For predicting students' academic risk, Vandamme et al. use Discriminant Analysis, Neural Networks, and Decision Trees. Discriminant Analysis produced the best results, with an overall classification rate of 57.35 percent. (Vandamme et al., 2007)

## DATA AND METHODOLOGY

### A. Data

The data that is used in the study comprises the dataset of a regional campus of a state-level university located in a rural area. A 3 -year data totaling 207 students have been taken. The variables in the data set (table 1) are associated with students' pre-admission marks (which are used to classify students for university admission) and the scores for all of the courses taught during the three years of the degree course. The degree course chosen for study is Bachelor of Computer Applications (BCA) which is a 3- year regular course. The data set is taken from a rural area campus, so it contains 75% data from the rural area and 25% from urban areas. The total marks are used as a performance indicator for testing the students' performance at the end of the degree program. The result attribute has two values 0 for fail and 1 for the pass. The value 0 is put in the data set when the student has left the course or has failed in the course, otherwise the value 1 for the pass when the student has completed the course and has cleared all the semesters. The base class taken is the performance, which is a nominal class and takes three values {Good, Bad or Average} depending on the attribute total marks attained by the student.

**TABLE 1: DATA SET FOR STUDY**

S no.	Attributes	Description
1	RNO	Roll number of students
2	NM	Name of the students
3	DOB	Date of Birth
4	GEN	Gender of the Student
5	FN	Father's name of the student
6	MN	Mother's Name of the student
7	FO	Father's occupation
8	MO	Mother's occupation
9	AI	Annual Income of the student
10	CAT	Category of students
11	REL	The Religion of the student
12	ADR	Address of the student
13	R10	Student 10 <sup>th</sup> Result in percentage
14	R12	Student 12 <sup>th</sup> result in percentage
15	STR	Subject opted by the student at school level like medical,non-medical, Commerce, Arts.
16	ARE	The Living area of student i.e. Urban or rural
17	PN	Phone no of the student
18	R1 -R6	1 <sup>st</sup> Sem -6th Sem result of BCA students
19	TOT	Total Marks of all semesters of a student
20	RES	Result show student result pass or fail
21	PER	Performance of student as good, average or bad

A data set of three years has been taken for the study. The year and no. of admissions done in each year are presented in Table II:

**TABLE II. YEAR-WISE INTAKE OF STUDENTS**

SNo	Year	No. of Students
1	Year1(2015)	90
2	Year 2(2016)	70
3	Year 3(2017)	47



## B. METHODOLOGY

### 1) PROCEDURES

WEKA provides several classifier algorithms. which aims to classified the data according to the defined pattern and behavior of the data.

a) NaiveBayes: It is based on the Bayes theorem. It's a set of classifiers algorithms that make use of estimator classes. It assumes that the input values are nominal, although numerical inputs are supported by assuming a distribution. While numerical inputs are provided by assuming a distribution, it assumes that the input values are nominal. Bayes theorem find the probability from the results

$$P(A/B) = P(B/A)P(A)/P(B)$$

In the above equation, the probability for A is to be evaluated when the value of B is given.

It uses the kernel density estimators, which improves performance if the normality assumption is grossly incorrect; it can also handle numeric attributes using supervised discretization. The data is divided into two parts. Features matrix which defines the features and attributes and the Response matrix which defines the prediction or output.

b) MLP:

It is a classifier that classifies instances in a dataset using back-propagation. It is made up of a large number of neurons that are linked in a pattern. Neurons are divided into three categories: Input Neurons that receive and process information. Hidden Neurons, where the actual processing is performed by neurons, and the output neurons are the ones that generate the results after they've been processed. (Kaur & Kaur, 2016)(Chakraborty et al., 2020)

c) ZeroR :

It's the most basic classifier since it only refers to the target and ignores the prediction. The majority class is predicted by this classifier. It is useful for establishing baseline performance as a comparison point for other classification methods.

d) J48:

It is a successor of C4.5. It is developed by Ross Quinlan. It uses a greedy and top-down approach for decision making the dataset is partitioned into smaller partitions that use a recursive divide and conquer strategy. The partition of the dataset uses heuristics that choose the best partition on the dataset. (Bashir & Chachoo, 2017)

e) SimpleCART: It is known as a classification and Regression Tree. It generates a binary decision tree. The best splitting attribute is chosen from Entropy. It uses a learning sample with pre-assigned classes for all the observations for building decision trees. It gives the result as a classification or regression tree depending on the input data. By cross-validation, it selects the best tree from the sequence of trees in the pruning process. This algorithm uses a greedy algorithm and selects the best feature at each stage of the process. When implementing, the dataset is split into two subgroups, that are most different in outcome. This procedure is continued on each sub-grouping until the minimum subgroup size is reached. (Kalmegh, 2015).

f) REPTree: It is known as Reduced Error Pruning Tree. It is a fast decision tree learner who builds a tree using information gain as the splitting criteria and prunes it using reduced error pruning. It sorts numeric attributes only. It uses regression tree logic and creates multiple trees in different computations. Then it selects the best one from the generated trees (Kalmegh, 2015).

### Performance Metrics

Different performance metrics for comparing different classification algorithms are elaborated below:

a) Kappa statistic:

Sometimes accuracy cannot be used as a measure for evaluating the performance of the unbalanced set. Then an important measure to be taken is Kappa statistics. It is an analog of the correlation coefficient. If the value is zero it means a lack of correlation and the value 1 means a high correlation between class labels and attributes. It compares the observed accuracy with the expected accuracy.

To calculate Observed Accuracy, add the number of instances that the machine learning classifier agreed with the ground truth label, and divide by the total number of instances.

The Expected Accuracy is directly related to the number of instances of each class along with the number of instances that the machine learning classifier agreed with the ground truth label.

The formulae used for calculating Kappa statistics is shown in equation (1)

$$\text{Kappa Statistics} = (\text{observed accuracy} - \text{expected accuracy}) / (1 - \text{expected accuracy}) \quad (1)$$

b) Mean absolute error:

It calculates the average loss in the data set. The formulae to calculate is shown in equation(2)

$$MAE = \frac{1}{n} \sum_{i=1}^n |x_i - \hat{x}| \quad (2)$$

Here  $x_i$  is a prediction value and  $x$  is a true value

c) Root mean squared error:

It calculates the difference between the predicted value and the actual observed value. It is a good measure of accuracy, but only to compare forecasting errors of different models for a particular variable and not between variables, as it is scale-dependent. It is also called the root-mean-square deviation, RMSD. shown in equation (3)

$$RMSE = \sqrt{\frac{1}{n} \sum_{j=i}^n (y_j - \hat{y}_j)^2} \quad (3)$$

d) Accuracy:

The accuracy is defined as how well a given predictor can guess the value of the predicted attribute for new data as in equation(4)

$$\text{Accuracy} = \frac{\text{number of sample predicted correctly}}{\text{total number of samples}} \quad (4)$$

e) TP rate :

It is a true positive rate which means Correctly classified are positive. given in equation (5)

$$TPR = \frac{TP}{TP+FN} \quad (5)$$

f) FP rate:

It is a false positive rate which means false classified is positive given in equation (6)

$$FPR = \frac{FP}{FP+TN} \quad (6)$$

Or

$$FPR = 1 - TNR$$

g) TN rate:

It is a true negative rate, which means correctly classified as wrong. given in equation (7)

$$TNR = \frac{TN}{FP+TN} \quad (7)$$

h) FN rate:

It is a false negative rate, which means false classified as wrong given in equation (8)

$$FNR = \frac{FN}{FN+TP} \quad (8)$$

Or

$$FNR = 1 - TPR$$

i) Precision:

It is classified items are truly classified given in equation (9)

$$\text{Precision} = \frac{TP}{TP+FP} \quad (9)$$

j) Recall:

It calculates, in actual item how many are classified given inequation (10)

$$\text{RECALL} = \frac{TP}{TP+FN} \quad (10)$$

k) F-Measure:

It is a combination of precision and recall, providing a single measure. It measures the accuracy of the test. It is the harmonic mean of precision and recall given in equation (11)

$$F1 = 2 * \left( \frac{\text{Precision} * \text{Recall}}{\text{Precision} + \text{Recall}} \right) \quad (11)$$

l) ROC area:

It is the receiver operating characteristic curve. It examines the outcome of tested data. It reads the performance by creating a graph of TP vs. FP. It is useful to change the dataset that each instance is assigned a TP or FP class before the plot is made.

m) MCC:

It is known as the Matthews Correlation Coefficient, which measures the quality of binary classification given inequation (12).

$$MCC = \frac{(TP * TN) - (FP * FN)}{\sqrt{(TP + FP)(TP + FN)(TN + FP)(TN + FN)}} \quad (12)$$

n) *PRC AREA:*

It is a precision-recall curve. The PRC area is calculated separately for each class by treating instances of the class as “positive” instances and instances of all other classes as “negative” instances.

o) *Confusion matrix:*

A confusion matrix is a technique for summarizing the performance of a classification algorithm shown in Table III.

**TABLE III. CONFUSION MATRIX**

	YES	NO
YES	TRUE POSITIVE(TP)	FALSE POSITIVE(FP)
NO	FALSE NEGATIVE(FN)	TRUE NEGATIVE(TN)

## RESULTS AND DISCUSSIONS

To address the research Question 1: To project the academic success of students enrolled in a three-year regular graduation program.

To compare their outputs, various classification models such as J48, ZeroR, MLP, CART, and REPTree are used. Table IV shows the results of classifiers under the 10-fold cross-validation testing condition. The MLP classifier shows an accuracy of 99% and Kappa Statistics of 0.98 which means a very good correlation between class label and attributes. This model performs the best among all the models. But the time taken to build the model is 11.28 sec which is a higher amount. The J48 algorithm performs with 97.5% accuracy and 0.95 Kappa Statistics while the time taken to build the model is very less as compared to MLP. The ZeroR performs the worst with 58.4% accuracy and 0 Kappa values which means no agreement. For checking the evaluation results under Percentage Split where only 66% of data is used as training data as shown in Table V. The results show the improvement for all the classifiers. The MLP classifier achieved 100% accuracy and an excellent correlation value of 1. While ZeroR shows an increase to 60% but it is of no considerable use as the Kappa Statistics value is 0.

The results are also verified by combining the various classifiers with AdaBoostM1. It is a common classifier ensemble that can be integrated with other supervised learning techniques (Kaur & Kaur, 2016). With AdaBoostM1, the voting approach is used to combine the different classification algorithms. When classifiers are combined in a voting system, the class assigned to the test instance would be the one indicated by the majority of the ensemble's base-level classifiers. (Pandey & Taruna, 2016) (*The Stacking Ensemble Approach*, n.d.). The results are elaborated in Table VI and Table VII for Cross-validation and Percentage Split respectively. On investigating, Table IV and VI, it is found that the maximum increase in the accuracy is shown by the ZeroR from 58.4% to 93.3% and Kappa Statistics value from 0 to 0.95. Hence, ZeroR performs well when combined with the boosting algorithm. The other classifiers show the marginal increase in the accuracy and Kappa Statistics. While ADBoostM1+MLP shows a marginal decrease in performance. On analyzing, Table V and VII, the classification algorithms: J48, NaiveBayes, and CART show no change in values whereas AdaBoostM1+MLP shows a decline of 2% in the accuracy. But a huge impact on ZeroR shows an increase in accuracy to 98.6%. By considering all the parameters it is being observed that the MLP classifier performs the best among all the classifiers by achieving a 100% accuracy and Kappa Statistics value of 1. The Cost-benefit analysis curves are derived for each of the classifiers presented in Fig 1 to 6 for various classifiers. By minimizing the cost, the maximum gain is achieved by MLP classifiers of 82.61 and ZeroR performs the worst by having a gain of 0.

**TABLE IV. COMPARISON RESULTS OF DIFFERENT CLASSIFIERS UNDER 10 FOLD CROSS-VALIDATION**

Metrics	Accuracy	Kappa statistics	ROC	Precision	Recall	F-measure	Time taken	Mean absolute error	Root mean squared error
Models									
J48	97.5%	0.95	0.98	0.97	0.97	0.97	0.04	0.12	0.12
ZeroR	58.4%	0	0.84	0.34	0.58	0.43	0	0.37	0.43
Navieb ayes	95.1%	0.9	0.99	0.95	0.95	0.95	0	0.03	0.16
MLP	99%	0.98	0.99	0.99	0.99	0.99	11.27	0.05	0.09
REPTree	89.3%	0.8	0.94	0.89	0.89	0.89	0.02	0.09	0.03
CART	97.1%	0.94	0.96	0.97	0.97	0.97	0.23	0.02	0.13

TABLE V. COMPARISON RESULTS OF DIFFERENT CLASSIFIERS UNDER PERCENTAGE SPLIT

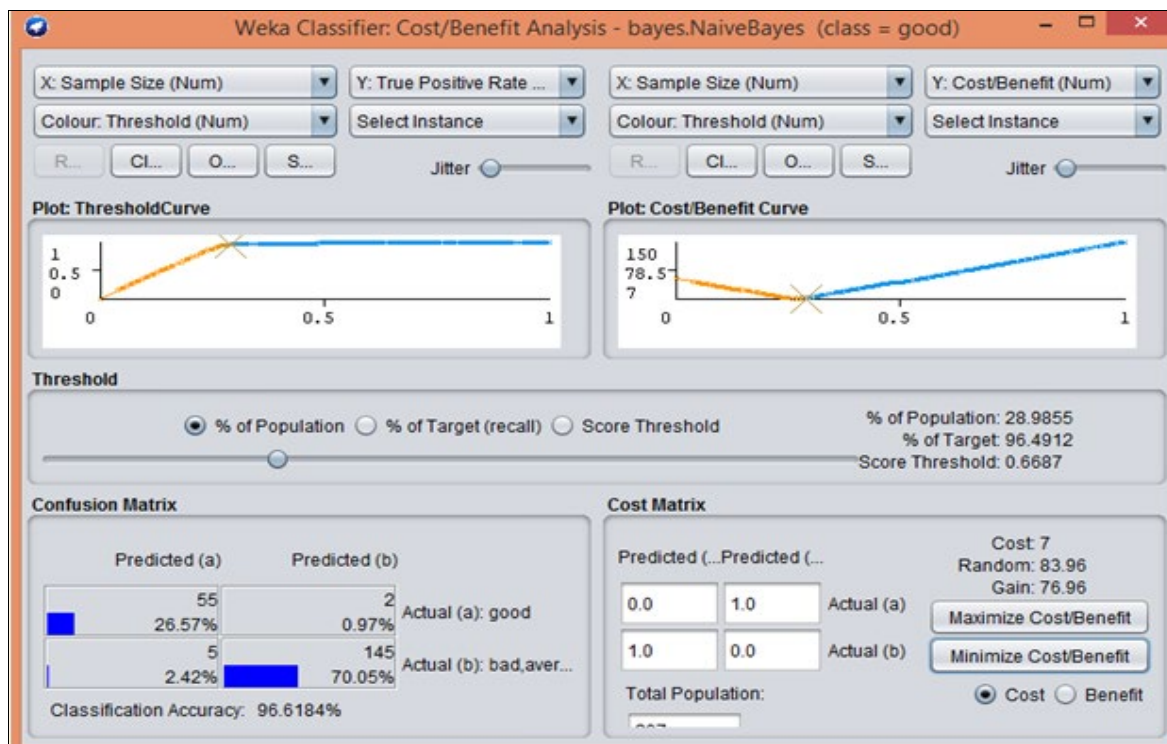
Metrics	Accuracy	Kappa statistics	ROC	Precision	Recall	F-measure	Time taken	Mean absolute error	Root mean squared error
Models									
J48	98.5%	0.97	0.98	0.98	0.98	0.98	0	0.01	0.09
ZeroR	60%	0	0.5	0.36	0.60	0.45	0	0.37	0.42
Navieb ayes	95.7%	0.92	0.99	0.95	0.95	0.95	0	0.03	0.16
MLP	100%	1	1	1	1	1	10.36	0.06	0.07
REPTree	92.8%	0.86	0.98	0.93	0.92	0.92	0	0.06	0.18
CART	98.61%	0.97	0.98	0.98	0.98	0.98	0.24	0.01	0.09

TABLE VI. COMPARISON RESULTS OF DIFFERENT CLASSIFIERS WHEN COMBINED WITH ADABOOST UNDER CROSS-VALIDATION

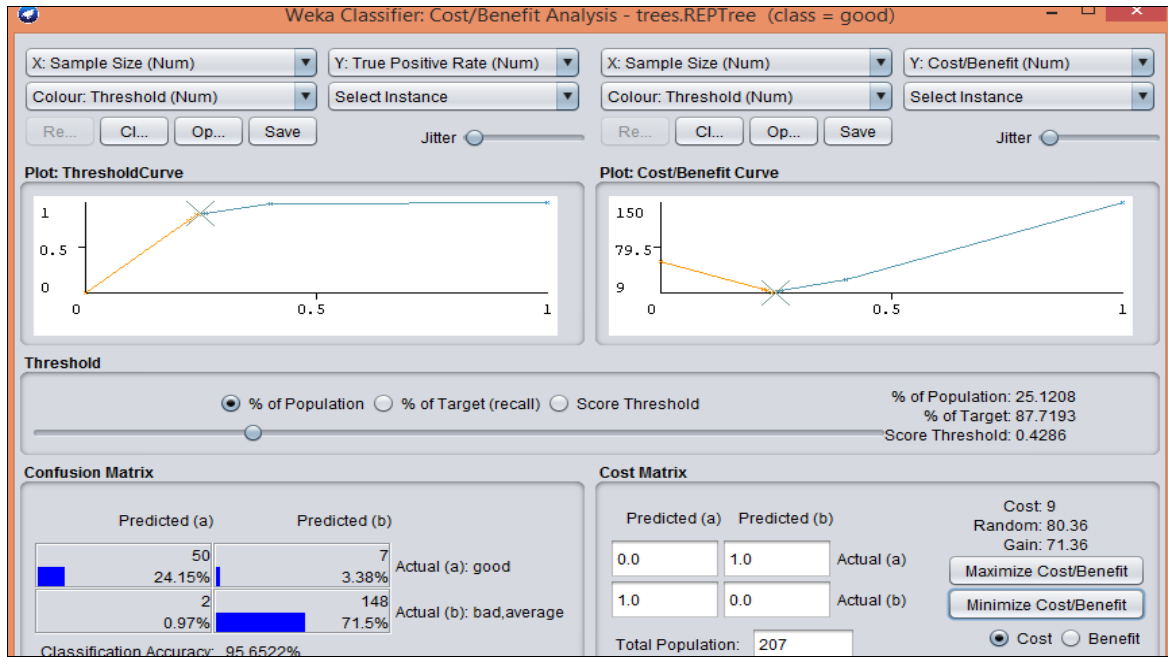
Metrics	Accuracy	Kappa statistics	ROC	Precision	Recall	F-measure	Time taken	Mean absolute error	Root mean squared error
Models									
Adaboost+J48	97.6%	0.95	0.99	0.97	0.97	0.97	0.02	0.04	0.13
Adaboost+ZeroR	93.3%	0.87	0.99	0.93	0.93	0.92	0.02	0.22	0.27
Adaboost+Navi ebayes	97.6%	0.95	0.99	0.97	0.97	0.97	0.01	0.05	0.13
Adaboost+MLP	98.1%	0.96	1	0.98	0.98	0.98	10.52	0.06	0.12
Adaboost+REP Tree	95.1%	0.91	0.99	0.95	0.95	0.95	0.01	0.08	0.17
Adaboost+CA RT	97.1%	0.94	0.99	0.97	0.97	0.97	0.28	0.05	0.14

**TABLE VII.** COMPARISON RESULTS OF DIFFERENT CLASSIFIERS WHEN COMBINED WITH ADABOOST UNDER PERCENTAGE SPLIT

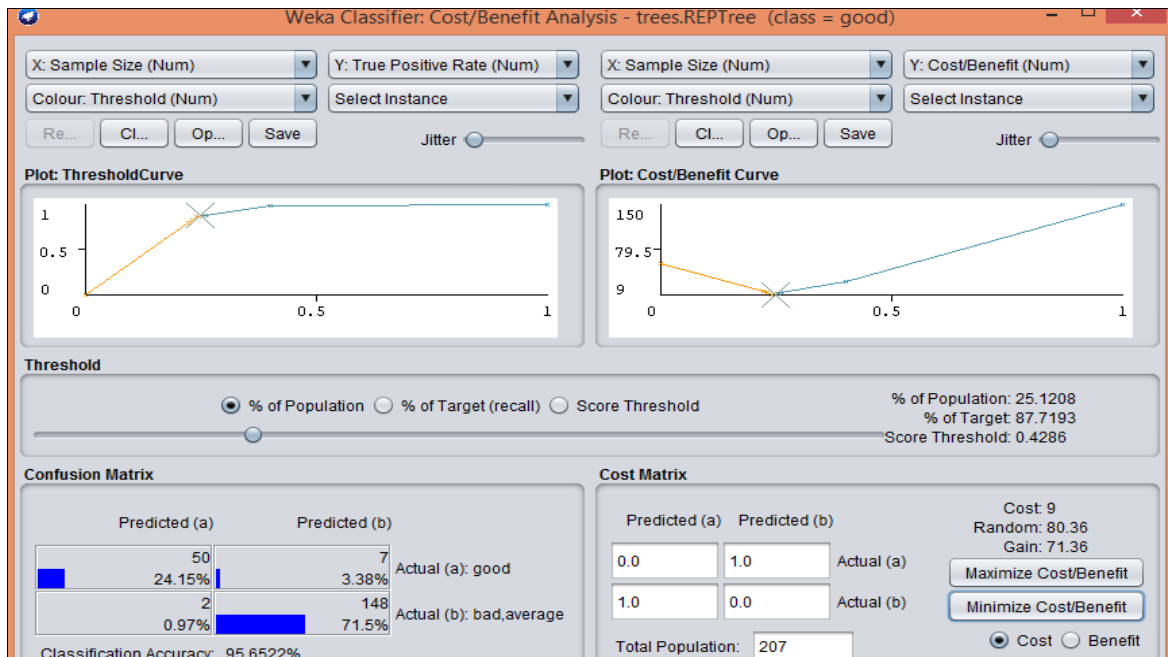
Metrics	Accuracy	Kappa statistics	ROC	Precision	Recall	F-measure	Time taken	Mean absolute error	Root mean squared error
<b>Models</b>									
<b>Adaboost+J48</b>	98.6%	0.97	0.99	0.98	0.98	0.98	0.02	0.04	0.11
<b>Adaboost+ZeroR</b>	98.6%	0.97	0.99	0.98	0.98	0.98	0.01	0.22	0.26
<b>Adaboost+Naive Bayes</b>	95.7%	0.92	0.99	0.95	0.95	0.95	0.04	0.05	0.13
<b>Adaboost+MLP</b>	98.6%	0.97	1.0	0.98	0.98	0.98	10.28	0.07	0.10
<b>Adaboost+Reptree</b>	98.6%	0.97	1.0	0.98	0.98	0.98	0.08	0.07	0.13
<b>Adaboost+CART</b>	98.6%	0.97	0.99	0.98	0.98	0.98	0.24	0.04	0.11



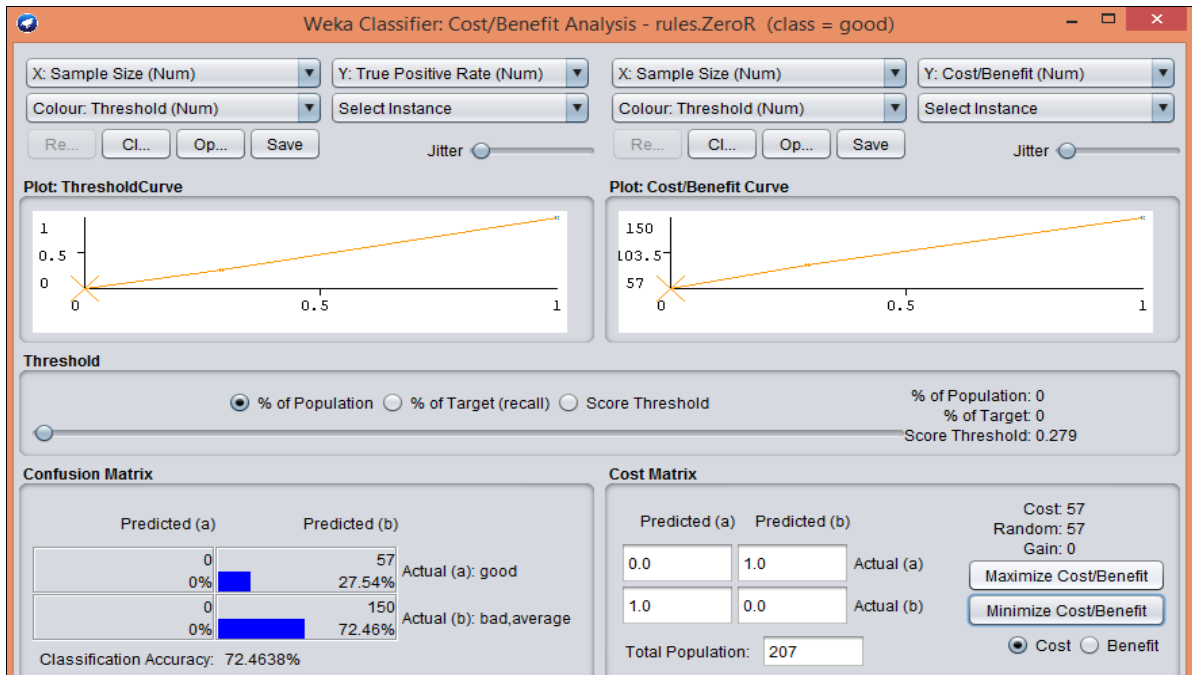
**Figure1: Cost-benefit Analysis for Naïve Bayes**



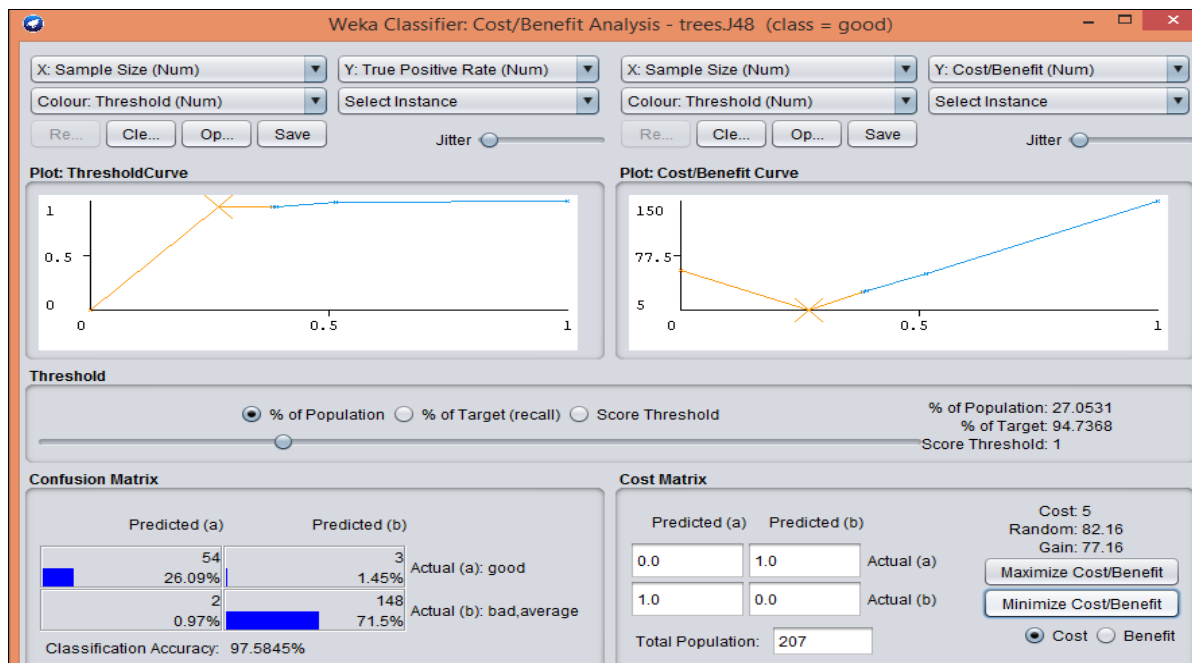
**Figure2:** Cost-benefit Analysis for REPTree



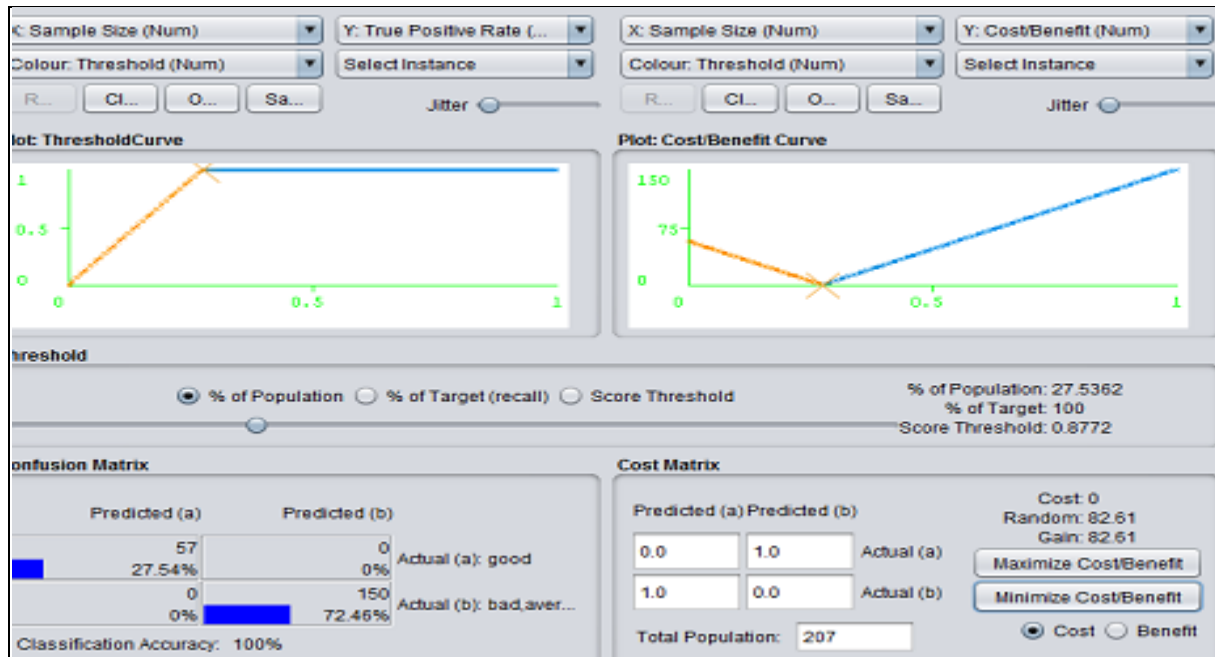
**Figure3:** Cost-benefit Analysis for CART



**Figure 4:** Cost-benefit Analysis for ZeroR



**Figure 5:** Cost-benefit Analysis for J48



**Figure 6:** Cost-benefit Analysis for MLP

To address research question 2: Which attributes rank the most important among the all in finding the Academic Performance.

For this Select Attributes tab is selected in WEKA and Attribute Evaluator is chosen as Classifier AttributeEval which evaluates the worth of an attribute by using a user-specified classifier. The Ranker Approach was chosen to rank the attributes based on their individual assessments(Affendey et al., 2010). By using the method and combining it with the Naive Bayes classifier to rank the attributes (as shown in Table VIII), it was discovered that background details and parameters, as well as required academic attributes like total points, play a significant role.

**TABLE VIII:** RANKING OF THE ATTRIBUTES

S no.	Attributes	Description	Ranking
1	RNO	Roll number of students	0.26
2	NM	Name of the students	0.001
3	DOB	Date of Birth	0.39
4	GEN	Gender of the Student	-0.0004
5	FN	Father's name of the student	0.11
6	MN	Mother's Name of the student	0.12
7	FO	Father's occupation	0.49
8	MO	Mother's occupation	0.23
9	AI	Annual Income of the student	0.51
10	CAT	Category of students	0.2
11	REL	The religion of the student	-0.0002
12	ADR	Address of the student	-0.0045
13	R10	Student 10 <sup>th</sup> Result in percentage	0.47
14	R12	Student 12 <sup>th</sup> result in percentage	0.45
15	STR	Subject opted by the student at school level like medical,non-medical, Commerce, Arts.	0.10
16	ARE	The Living area of student i.e. Urban or rural	0.59
17	PN	Phone no of the student	0



18	R1	1 <sup>st</sup> Sem result of BCA students	0.68
19	R2	2 <sup>nd</sup> Sem result of BCA students	0.61
20	R3	3 <sup>rd</sup> Sem result of BCA students	0.66
21	R4	4 <sup>th</sup> Sem result of BCA students	0.58
22	R5	5 <sup>th</sup> Sem result of BCA students	0.57
23	R6	6 <sup>th</sup> Sem result of BCA students	0.70
24	TOT	Total Marks of all semesters of a student	0.72
25	RES	Result show student result pass or fail	0.71
26	PER	Performance of student as good, average or bad	Base Class

To address research question 3: When are the dropout rates of the student's maximum.

For the answer to this, by observing the dataset it has been found that whose result in initial entry points to the institution is below the average are the most to get dropout in the graduation class. For this J48 tree was analyzed. The reasons for the drop-outs can be linked easily to the fear of new institutions, new courses, and a whole changed paradigm of the education environment. It can also be seen as a trend that the alarming number of students after the completion of their secondary examination is going abroad to pursue higher education. From the reports, Punjab has shown a decline of 30% in admissions from July 2017 and most of the students belong to rural areas. This number is sky-rocketing as youth is unable to find suitable jobs after the completion of the study. Moreover, the poor educational qualifications of the family are also the signaling parameter found in the study. More awareness campaigns, lectures should be delivered to motivate the youth. Also, a well-qualified faculty is a major requirement of these institutes to morale up the students to work hard.

## CONCLUSION AND FUTURE SCOPE

This paper investigates the possibility to predict accurately the performance of the graduate students studying in the rural area with the help of a contemporary data mining tool as WEKA 3.8.1. The results show that MLP classifiers outperform all the classifiers picked for investigation. It gives 100% accuracy and a very good Kappa Statistics value of 1. This paper additionally brings to focus that not only accuracy but Kappa Statistics and ROC curves produce a huge impact on calculating the performance of the classifier. By using the ensemble approach, AdaBoost was ensembled with the chosen classifiers for the study. The results produce a picture that all the classifiers have shown an improvement in the performance of the classifier. However, MLP shows a marginal decline in the values whereas ZeroR classifiers perform the worst among all. When investigating the major attributes that affect the performance of the student, the most influential were the marks of the different semesters in graduation, Area(Rural or Urban), Parental Income, and Occupation. It was also seen from the results that most of the dropouts are occurring in the first year of the study in the course. This paper deals with many reasons for the alarming number of dropouts and how to increase the retention of the students. More suitable jobs, well-qualified faculty, and awareness campaigns are areas that need to be focused on to tackle this issue.

These results can be useful to investigate the keyholes and will help the management, teachers, and students to fill the gaps and to boost education in the rural areas. It also put pressure to look upon an alarming rise in the dropout rates in rural areas and what measures to be adopted to increase the performance of the students.

The research can be further extended by taking a dataset from an urban area college and comparing it with a rural area based on various parameters.

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## PERSPECTIVE OF INTERIOR DESIGN STUDENTS TOWARDS ONLINE CLASSES AMID COVID-19 PANDEMIC IN INDIA

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### ABSTRACT

Currently, the entire world is gripped by the dangerous novel coronavirus. It impacted the education system. Interior designing education, mingle creativity with meticulousness, and technical skills are taught to design space practically, distinct from another stream. This study focuses attention on online learning in interior design education. This research aims to find out the interior design students' perspective and discovered online learning to be profitable and the student's experience was more leaned towards positive aspects. The outcomes of this research hopefully allow institutions to appraise their curriculums on the ground of the findings and the suggestions by this study, as online classes are our future and best solution during COVID-19.

**Keywords:** COVID-19; Online Classes; Interior Design Students; Education; Perspective

### INTRODUCTION

Today the entire world is affected by the COVID-19. In December 2019 disease appeared in China, known as the *Wuhan virus*, that mutated from an animal, it outbreaks (when an infection happens in surprisingly high numbers and don't remain in one area spread widely.) till late December. Named as COVID-19 by the World health organization, an extremely contagious disease spread from one human being to another (Das 2021). The outbreak from COVID-19 is termed a pandemic by the WHO. A Pandemic implies any disease that is severe outbreak spreads quickly crossways nations and continents, infects and takes the lives of many people. SARS and COVID-19 both diseases are due to "Coronavirus" it affects the respiratory tract, SARS is by SARS-CoV, while COVID-19 by SARS-CoV2, is an enclosed and sphere-shaped unit having a rough diameter of 120 nm and comprising a definite -sense specific RNA stranded genome (Liu, Kuo, & Shih 2020). SARS-CoV2 is considered as beta-corona virus which belongs to the *Coronaviridae* family. Covid-19 is an extremely contagious disease as it is transmitted from one to another person (Chatterjee, Nagi, Agarwal, Das, Banerjee, Sarkar, Gupta, & Gangakhedkar 2020). This disease has affected humankind. Symptoms and Indications of corona virus disease (COVID-19) can emerge between two to fourteen days subsequently the person gets infected. Standard symptoms are cough and cold, fever, tribulation in breathing, aching throat, extra mucus from the nose, and few patients affected with COVID-19 also having the deficiency of fragrance and taste. The time after infection and before the symptoms appears to be so-called the period of incubation. Indeed, in the incubation period person can infect another person. Symptoms are broadly like a viral infection which can trigger critical conditions and mortality (Kachroo, 2020).

The study established, Coronavirus spread from one human being to another via the droplets, produced by the sneeze and cough of an infected person. It can also be transmitted if a person comes in contact with the surface used by an infected person (Jamwal, Bhatnagar, & Sharma 2020). So, swift spread through infected person to others. All age groups can be infected by COVID-19 (Kumar, Kumar D., Christopher, & George 2020). The spread can be reduced by stopping the human-to-human transmissions, so mass gathering must be avoided. The report suggested, human beings don't have immunity to this virus. It is challenging to prevent the transmission of this virus. So, social distancing and lockdown were merely methods to slow down the spreading speed of the COVID-19 (Madiope, & Mendy 2021). It will break down the transmission chain and so the government implemented a lockdown. By the mid of April 2020, almost 186 countries have implemented lockdown nationwide.

Subsequently, numbers are increasing drastically all over the world. Total 223 countries are affected by Coronavirus, confirmed cases are 121,278,482 from which 97,817,867 recovered, 2,682,258 casualties and 17,933,724 are active cases, according to the WHO report, till 16<sup>th</sup> March 2021. India second largest populated country, with a 1.34 billion population having 11,409,831 confirmed cases from which 11,045,284 got recovered, 158,856 deaths and 236008 are active cases (UNESCO, 16<sup>th</sup> March 2021). "WHO" had given clear instructions like to keep physical distance, wear a mask, good ventilation, clean hands frequently, and avoid crowded places to stop to spread in the community. But in the educational system to follow this rule is nearly impossible, so in

lockdown and even in the unlock process education institutes were not allowed to open (Gurung, 2021). There will be no relief from an erratic enemy in India in the future too. So, in the future also not possible to start the education system as it can trigger conditions, life will not be the same as before the pandemic and at this point, online learning will continue (T.Muthuprasad, Aditya, & Jha 2020). During this odd phase of the Covid-19 pandemic, the traditional education (face to face) technique is not suitable. The circumstances led to the forced inclination of learners towards online learning. To persist in education and learning in institutions, our educational organization has resorted to an online learning model (Jena, 2020), an imperfect yet swift alternative to the crises.

Education originated from the Latin word “Educatum” which means the action of educating or training. Education is the procedure to facilitate learning or the gaining of knowledge, skill, values, and principles. Online classes were the most satisfactory option, it has given new soaring to education amid the COVID-19 Pandemic in India, it reduced students and teachers' distance. There are many “streams” or branches in the Indian education system, Science, Arts, Engineering, Medicine Stream, and many more. Ahmad & Rahi (2020) studied the perspective of students regarding online classes from the Arts, Science, and Commerce stream. Malley, & McCraw (2000) surveyed management, accounting, and finance courses and that students perceive that Online Learning as significantly beneficial than the traditional method. After studying the perception of undergraduate students of English Literature, Psychology, and Communication. Bali, & Liu (2018) concluded that satisfaction, perceived online and traditional are almost the same. Linjawi, & Alfadda (2018) done a study to know the perspective of dental students, but students perceive online tools as not user-friendly. Forsyth, Yovkova, & Aleksieva (2018) their research shows positive result towards online classes for students of educational fields like history, Philology, Mathematics, Computer Science, Economics, Biology, and Mass Communication. Chick, Clifton, Peace, Hale, & Alseidi (2020) paper suggested online education and teleconferencing bridge the gap which occurred in surgical education during the lockdown, they believe there is no alternative face to face learning. Different education stream students having different perceptions of online classes (Pokhrel, & Chhetri 2021).

Interior design is the skill and knowledge of enriching the interior of an area to accomplish a vigorous and aesthetically delightful atmosphere for an individual utilizing the space. An interior designer is a person who plans, designs, organizes, and accomplishes projects. Haddad (2013) stated Interior design is a multi-dimensional profession that embraces conceptual expansion, planning of space, and site examinations. Be in contact with the contractors on a project, construction supervisors, and implementation of the design. According to Bilda, & Demirkan (2002), the planning of interior areas is similar to the provisional and the blunder process that the designer picks out from the options of dimension, planning areas, and arrangement of essentials conferring to requirements of customers, specialized and emotional factors.

It is universal that interior design education training is different, As Behm, (2016) stated Interior design is predominantly implicit as a ‘proficiently managed practice-based development of the design and understanding of interior areas and all the essentials within. The study emphasizes, the sentiments and feelings should be a part of education in interior design. According to Hildebrandt (2005), interior design education explains the objective of design, and a design methodology, and how to define the problem and solve the problem. In his research Tural, (2006) defined, that individuals trained by the education of interior design, understand, how to augment the purpose and excellence in the interior areas. The designer should know, to enhance the eminence of an area, intensifying productivity (Attiwill 2002), and even guarding the users' security, comfort, and endeavors to accomplish the desires and requirements of clients (Key 2004; Tural, 2006).

In a nutshell, interior design education focuses on how area and interior must appear and changes effects on the well-being. Interior design is entirely about human being’s behavior and how they interact. For interior designers, ethical criteria are guideline standards. The biggest challenge for an interior designer is to understand the client’s requirements and delivering them according to their desire and need, these things are taught to interior students in their education.

It can be concluded that interior design education is slighter different. Moreover, it demands exclusive education (Hall, & Landström 2015) than other streams undoubtedly because of more practical studies, it mingles creativity with meticulousness and technical skills are in the curriculum. An interior design is termed valuable when it ponders all the objective, conservation, and analyze all the elements and harmonize them to create space that gives a functional, emotional, and veracious atmosphere. Education in interior design differs from other streams. So, the perception of students towards online will be different from those of students of another stream. Till now, no study had been done to know the perspective of interior design students towards online classes in India. This study tried to fill up that gap, concentrating attention on online learning in interior design education.

Every disaster arrives with great challenges despite prospects for revolution. This research aims to find out the perspective of interior design students' regarding online classes, the outcomes of this study could play a significant role in deciding what will be the future of the studying environment not only of interior designer education but other related design and creative streams like Fashion designing, Industrial designing, Product Design, and Architecture stream and whether online classes elevate learning, this research hopefully allows institutions to appraise their curriculums on the ground of the findings and the suggestions by this study.

## METHODOLOGY

### Method

A researcher had used a survey technique, and online structured questionnaires, to check the accurateness and understand the perspective and experience of interior design students, towards online classes in a much better way.

### Research Questions

The questions were designed according to Patton, (1990) who designed six distinctive kinds of questions that aided useful data in the research study and help to understand the state of affairs or event in a much better way. The questionnaire survey consisted of 22 questions distributed into five prominent groups.

- **Student's awareness of technology:** How much interior design students are aware and user friendly with technology.
- **Student's experience and interaction in online classes:** What interior design students sense, experience and feel about online classes.
- **Student demographics:** Do gender, geographical location, and qualification level affects the perspective of Interior Design students.
- **Student's problems and opinion during online classes:** What problems are interior design students facing during online classes
- **Student's satisfaction:** Are interior design students satisfied and what they desire in the future.

### Study Sample

Interior Design students were picked as the respondents for this study as interior designing is a different discipline that comprises subjects varying from design to material sciences, students work from workshop to field. The study confined to 189 students pursuing diplomas, degrees, and masters from different universities and colleges of India. A total of 189 students (Male 90, Female 99) Wittingly random gender and demographics sampling were done for analysis.

### Study Domain

Initially, key-informants from different interior design colleges and universities were identified in an online survey. The Google form link was forwarded to the key- informants by WhatsApp. The respondents, circulated the questionnaire to other students, as snowball sampling. ( Naderifar, Goli, & Ghaljaie 2017) they stated, snowball sampling should be adapted for enlisting contestants in educational agendas or research surveys. The link was disabled after a week after distributing the Google forms. A total of 189 students responded from different interior designing universities and colleges in India.

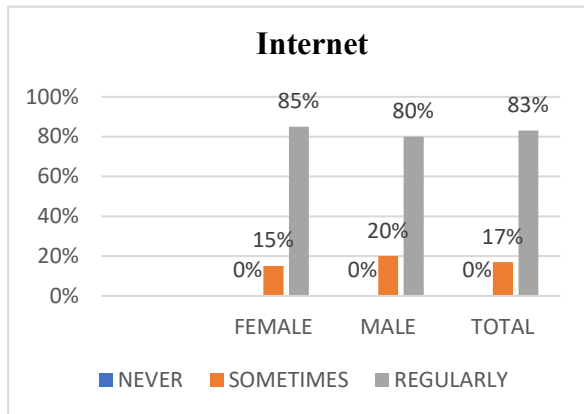
### Data Collection and Analysis:

The information was gathered employing a questionnaire, Likert scale of 1–4 (varying from “strongly disagree” (SD) to “strongly agree” (SA)), closed questions like Yes/No, and open-ended questions, on that basis result and data were checked and compared. Data were analyzed on an Excel spreadsheet via different statistical methods like percentages, mean, and standard deviation. Statistics were represented through pie charts, graphs, and tables.

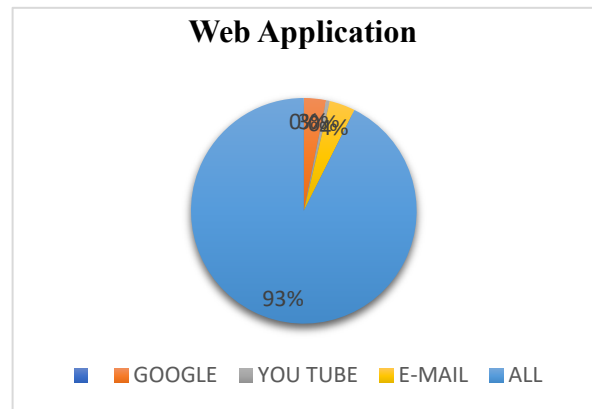
## RESULT

Results from analysis of data congregated from the study are presented beneath.

**Students' awareness of technology:** The aspects that could extremely influence students' perspectives toward online classes are their proficiency and awareness of the technology. Lack of skills can lead to obstacles and will trigger nervousness and demotivation for online education, on the other hand, awareness and proficient skills generate self-confidence in operating modern technology and establish an optimistic approach regarding online classes. Among the 189 of which 99 were females and 90 males who responded to this questionnaire. As shown in **Chart.1** 85% of female students used the internet regularly, 15% sometimes and 80% of male students used the internet regularly and rest 20% sometimes total 83% of the students using the internet regularly. There was not a single student who had not used the internet. Google (3%), e-mail (7%), and 90% of the females used all the web applications. Males used google (3%) and YouTube (1%) and 96% used all the web applications So, 93% of the total students used all the web applications as shown in **Chart. 2.**

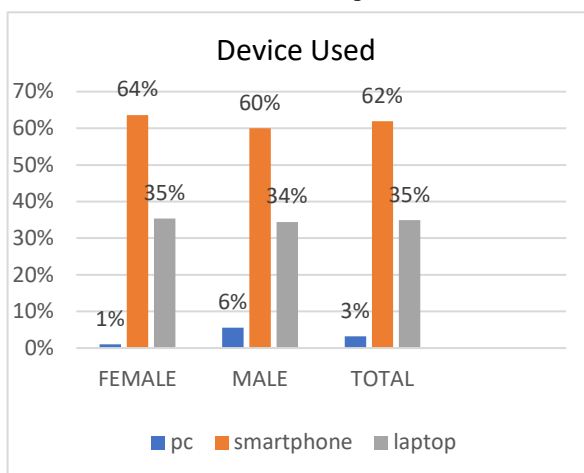


**Chart 1:USE OF INTERNET**

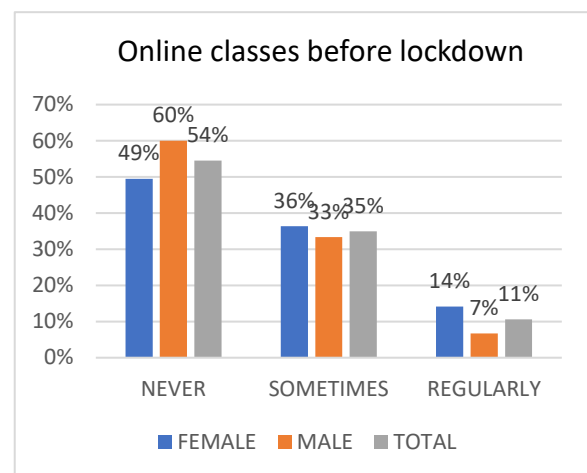


**Chart 2: USE OF WEB APPLICATION**

**Chart 3** investigate which of the most popular device commonly used by the students in online classes indicates, almost 64% of females using smart phones, 35% using laptops, and hardly 1% operating PC. 60% of males using smart phones, 34% laptops, and only 6% using a PC. Total 62% of students using smart phones. Another Likert-scale question inspects the students had ever done online classes before the lockdown It is shown in **Chart 4**, which indicates females never (49%) sometimes (36%) and regularly (14%) done online classes before the lockdown. Males never (60%) sometimes (33%)and regularly (7%) done it before. Total 54% of students had never done online classes before the pandemic.



**Chart 3: Device Used**



**Chart 4:Online classes before lockdown**

**Students' experience and interaction in online classes:** To understand students' perspectives towards online classes and the interrelation of the online in the stream of interior design education and the attitude of designing the students towards it. Examined, if there any statistically substantial relationship between the experience of interior design students and their approach to particular modules of online classes like understanding, submission, communication, support from the teacher during online classes. Respondents in this study total (n=189) were students pursuing interior design. The study used a four-point Likert scale from 1 to 4 ((SD) strongly disagree, (D) disagree, (A) agree, (SA) strongly agree to evaluate students' perspective toward online classes and face-to-face. As shown in **Table1**, interior design students' perspective towards online classes show significantly higher than the face to face. Interior students rated online learning higher in all aspects. Understanding the subject (M=2.91, SD=2.46) communication (M=2.95, SD=2.49), support (M=2.99, SD=2.53), Doubts clearance (M=2.90, SD=2.46), submission (M=2.94, SD=2.49), online exams (M=2.95, SD=2.52), save time (M=3.34, SD=2.87), save money (M=3.33, SD=2.87), management of classes and other work (M=3.24, SD=2.81). **Table 1** shows that the average Perspective level of interior students of online classes is 3.05, mean values is greater than the midpoint.

**Table 1:** Perspective of students towards online classes

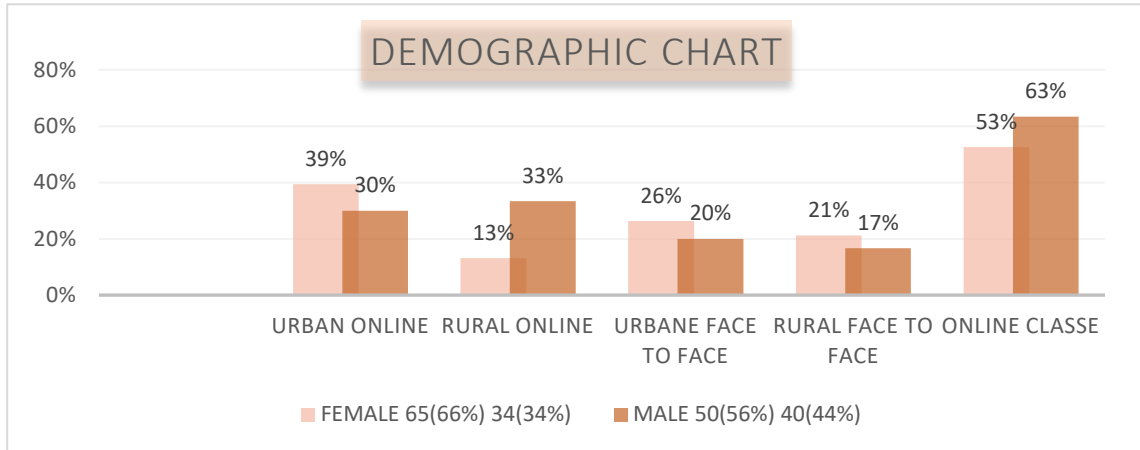
QUESTIONS	(SD)	(D)	(A)	(SA)	TOTAL	MEAN	SD
Online classes are user friendly	11	10	133	35	189	3.02	2.56
Understand your subject perfectly	9	28	123	29	189	2.91	2.46
Good communication with professors	8	26	123	32	189	2.95	2.49
Full support of teachers	8	19	128	34	189	2.99	2.53
Doubts are properly cleared	11	26	122	30	189	2.90	2.46
Syllabus going on time	9	15	139	26	189	2.96	2.49
Better way for submission	12	18	128	31	189	2.94	2.49
Online exams are better	10	28	112	39	189	2.95	2.52
Online classes save time (travelling)	1	12	97	79	189	3.34	2.87
Online classes save money (travelling, rent)	2	14	92	81	189	3.33	2.87
You can manage your classes and other work in better way	10	16	82	81	189	3.24	2.81
				<b>Average Mean</b>		<b>3.05</b>	

**Student demographic profiles:** Interior design students, demographic profile were analyzed to study whether the demographic particulars and attitudes of students were interdependent and affect approach towards online classes. **Table 2** shows, 52% were female and 42% were male. From which (15.3%) masters, (11.6%) diploma and the majority of the respondents (73%) were pursuing a degree in interior designing. Regarding the Homeplace, (58%) respondents were from urban areas and (42%) from rural areas.

Rendering the acquired data, the utmost considerable dependencies were among the gender and geographic areas. According to **Chart 5** (66%) of Females from urban areas from which (39%) supported online and (26%) face to face rest (34%) were from rural areas, who responded (13%) for online classes and (21%) face to face. Whereas in the case of the male respondents (56%) from urban areas from which (30%) supported online and (20%) face to face rest (44%) from rural areas who responded (33%) online and (17%) face to face.

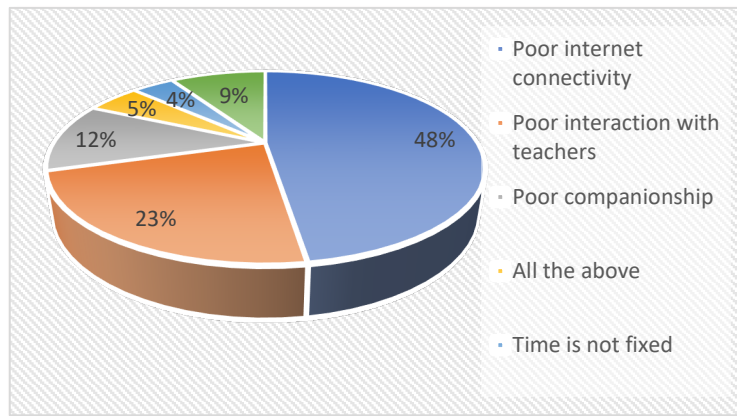
Particulars		Respondents	Percentage
	<b>Female</b>	<b>99</b>	<b>52%</b>
<b>Gender</b>	<b>Male</b>	<b>90</b>	<b>48%</b>
	<b>Total</b>	<b>189</b>	<b>100%</b>
	<b>Masters</b>	<b>29</b>	<b>15%</b>
<b>Education</b>	<b>Degree</b>	<b>138</b>	<b>73%</b>
	<b>Diploma</b>	<b>22</b>	<b>12%</b>
	<b>Total</b>	<b>189</b>	<b>100%</b>
<b>Home place</b>	<b>Urban</b>	<b>110</b>	<b>58%</b>
	<b>Rural</b>	<b>79</b>	<b>42%</b>
	<b>Total</b>	<b>189</b>	<b>100%</b>

**Table 2: Demographic profile**



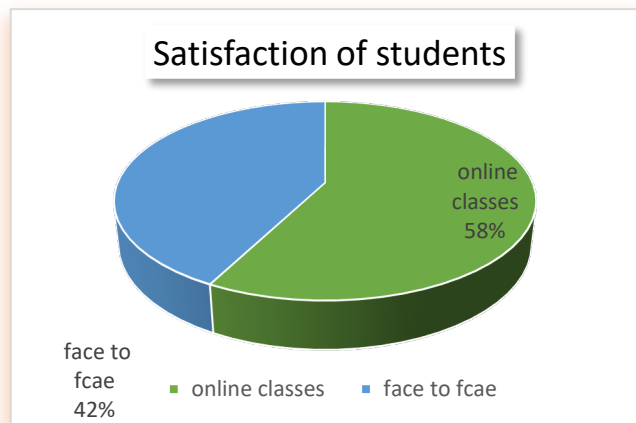
**Chart 5:** Demographics Chart

**Student's problems and opinions during online classes:** From the results of the survey problems were analyzed which students facing during online classes. According to the result, shown in **Chart. 6** 48 % of respondents are extremely influenced by the Poor internet connectivity, 23% Poor interaction with teachers, 12% felt Poor companionship, 5% faced all the above, 4% experienced that time is not fixed during online classes and 9% felt no technical support during online classes.



**Chart 6:** Problems during online classes

**Student satisfaction:** Among 189 respondents from interior design **109** respondents were satisfied by online classes and 80 wants a face to face, which is 58% supported online classes and the rest of the students (42%) wanted face-to-face. As shown in **Chart 7**



**Chart 7:** Satisfaction of student

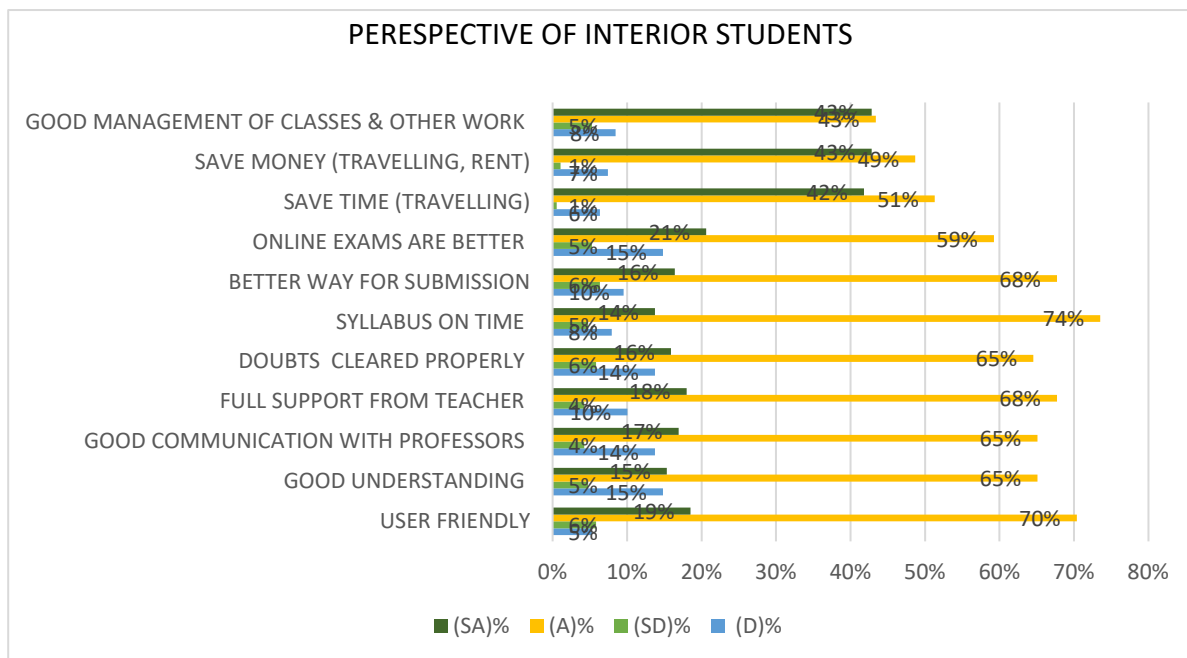


**DISCUSSION**

The objective of this study was to understand the Perspective of interior design students towards online classes amid the COVID-19 pandemic in India.

**Students' awareness of technology:** The perspective of students highly shaped by their awareness and their user-friendliness with technology (Mensah, Mensah, Gyapong, & Taley 2021). A good foundation of technology supports online learning (Linjawi, & Alfadda 2018). The study reveals that more than 80% of students regularly use the internet. Liu (2012) stated, in the present scenario, the internet has become the biggest communication network in the whole world, it is a widespread language to communicate. Almost 90% of students using all the web applications. Beyond 60% of students using smartphones regularly. Tsai & Lin (2004) concluded, more proficiency in computer usage, awareness of technology and the internet plays an important factor in defining the efficiency of online classes. Users having more experience and awareness of technology the higher will their positive attitude towards online learning (Simmers, & Anandarajan, 2001). Practically 54% of students had never done online classes before the pandemic, despite this not influenced their perspective. According to the data round, about 80% of students make use of the internet frequently and 90% of them operating all the web applications like Google, YouTube, and E-mail. This indicates that interior design students are completely aware and user-friendly with technology while gender and demographic factor have no significant effect on their awareness. Interior design students expressed a progressive attitude regarding the technology they are extremely aware of the technology.

**Students' experience and interaction in online classes:** Data display that those statements in which mean score is more than the midpoint, are relatively positive perception and those statements which mean score is less than midpoint is a relatively negative perception of students towards the above-mentioned statements considering the perspective of students towards online classes. As per the **Chart. 8** (70%) interior students agreed that online classes user-friendly (Matsunaga 2016), (65%) a good understanding, communication and doubt clearance, (68%) get full support from teachers and a better way of submission, (74%) felt syllabus going on time this result is contrary to Smart, & Cappel (2006); Aboagye, Yawson, & Appiah (2020) and more than (80%) strongly agree and agree that online classes save time same as affirmed by Malley, & McCraw (2000); Linjawi, & Alfadda (2018), saves money, and offers great flexibility to manage the study and other work (Das 2021).



**Chart 8:** Perspective Of Interior Students

The analysis of the responses in the questionnaire delivers a positive attitude of interior design students towards the online classes more than 70% of students believe that the online method is better as good interaction, communication, and support from teachers. Lowenthal (2009) affirmed more that communication more satisfaction of students. Online classes give flexibility, students are learning in their own space getting more freedom to study and perform other work at the same time. No hassle's to drive to college and come back, it saves time (Fidalgo, Thormann, Kulyk, & Lencastre 2020), and easy to plan work with the class, save money on vehicle

or petrol (Forsyth, Yovkova, and Aleksieva 2018), and no hassles to leave in hostels or in-room other problems like food and traveling (Ahmad, & Rahi 2020). The findings show the positive perspective of interior design students towards online classes they find online learning superior as it saves time and money gives flexibility a good understanding, communication, and user friendly.

**Student demographic profiles:** Rendering the acquired facts, the highly considerable dependency is those among the factors like gender and geographic location. As data shows, urban females support online classes are almost thrice the rural females, but the case is not the same for male's willingness towards online classes it is not affected by demographic location in both the urban and rural it is almost the same. Results revealed were Interesting regarding the study of the interrelationship between education level and the perspective of students, significant no correlations were found. Willingness or acceptance towards online classes are more in males compared to females, this result is contrary to Simmers, & Anandarajan (2001); Matsunaga (2016). An overall high percentage of students accepted online classes.

**Students problems and opinion during online classes:** Besides positive aspects, there were negative aspects also, the analysis exposes while they are learning in their own space they are not having direct interaction with their teachers and friends so students felt lonely (Jena 2020) and solitary, sometimes teachers don't solve their doubts properly and at right time and if they got stuck to any technical point students don't receive any technical support from their instructor or universities/college (Yang, & Cornelius 2004). Students must have full support and assistance for online learning (Linjawi, & Alfadda 2018) duration of classes is not fixed and major students are facing poor internet connectivity (Pokhrel, & Chhetri 2021). Due to low internet connectivity, many times students had to skip or fail to see a section of classes or found it hard to connect, and this factor possibly affects interior design students' opinion largely and they found it less beneficial (Aboagye, Yawson, Appiah 2020). To the same degree, it allows studying at its own pace and provides more flexibility but lacks in social presence, interaction, and communication (Bali, & Liu 2018). The experience of the students and perspective towards online classes could have been more favorable if this factor should be given special focus and overhauled.

**Students satisfaction:** After the survey analysis, it is observed that students are having both positive perspectives like good understanding, communication, doubt clearance, better way of submission, syllabus on time, and above all students strongly agree that online classes save time, money, and offers great flexibility to manage the study and other work. Negative perspective as students felt lonely and solitary, teachers don't interact properly and students don't receive any technical support from their instructor or universities/college and above all poor internet connectivity. Despite all these negative aspects, students' perspective regarding online classes was more leaning towards positive aspects and found online learning to be profitable, it is apparent that the majority of interior design students were satisfied with online classes as affirmed by Gurung (2021). Yet there are few factors, which should be worked out, but more percentage of students are satisfied and they desire the same, even in the future. (Agarwal, & Kaushik 2020) they believe it smashed monotonous schedule students are quite satisfied with online learning, suggest to bring online teaching a part of the education system in the future after this pandemic also.

## CONCLUSION:

Interior design education is the skill and knowledge of augmenting the specific area and accomplishing a wholesome and aesthetically delightful atmosphere for an individual utilizing a particular space. Due to the covid-19 dark cloud was hanging over the student's future; so, the solution which arrived at this problem is online classes. Today's generation is more enthusiastic about using modern technology, as they are in touch with this technology by birth, they do not perceive it as an instrument, whereas for learning and entertainment. Research indicates positive results towards online classes, it is fruitful for students they can integrate studies with their work and personal schedules, save time and money, the better mode to deliver exams, assignment submission and syllabus is on time. But few students getting frustrated by poor internet deemed lonely and solitary without their friends, teachers don't interact properly and perplexed level boost while not receiving any technical support from their teachers or college /universities. The study uncovered both the advantage and the obstacles of online classes, from the perspective of interior design students.

Even though the study depicted a wider picture of the effectiveness of an online course, the study is not conducted to show its positive and negative aspects. As online technology holds great potential both for rising knowledge and for stimulating learning, and in the present scenario, this study is more significant in respect to India, as the online education system was certainly not tried before to this magnitude, it is gigantic social experimentation. Still, after unlocking, life will not be the same as before the pandemic and at this point, possibly the online learning will continue in the future too. To enhance online education the system should focus on internet services, must provide a better internet facility to students. Teachers play an important role as they are the one who links with students. So, it's their job to fill the gap and generate more interaction with students, the duration of the classes should be

fixed to increase the impact of online classes, and the administration should deliver the proper technical support to students. If this factor should be given special focus and overhauled, the efficacy of online classes will increase and flourish the satisfaction for online classes in interior design students. The study found online learning to be profitable and the student's experience was more leaned towards positive aspects. Online learning has emerged as the best and only option available to remove the dark cloud which was hanging over the student's future due to COVID-19 Pandemic. The outcomes of this research hopefully allow colleges/universities to appraise their curriculums on the ground of the findings and the suggestions by this study.

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## PREFERENCE BASED E-LEARNING DURING COVID-19 LOCKDOWN: AN EXPLORATION

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### ABSTRACT

Before 2020, In India online education was considered as secondary source of education. Due to COVID-19 lockdown there is drastic change in education system. There are more than 1.2 billion students are out of the classroom all over the world. Digital platform plays a significant role in e-learning to undertake teaching and learning process remotely. During pandemic period there is significant growth in usage of e-learning software's, video conferencing tools, language applications, social media and electronic devices. Many e-learning applications are freely available and accessible for online education. Initially it was difficult to accept online education in rural area and for primary education. Due to the pandemic situation most of the teachers as well as students accepted online platform for education. Selection and access of right e-learning technology leads to more effective e-learning outcome. This research paper focus on identifying students' preference for using e-learning resources and applications in higher education.

**Keywords:** E-learning, Virtual Classroom, Learning Management System, Flipped Classroom, e-learning Resources, Moodle, Google Classroom

### 1. INTRODUCTION

Due to technology revolution, the field of education has experienced enormous changes in the process of teaching and learning methodologies. The internet has a valuable contribution to transform the entire process of teaching, learning and development to the virtual world. The young generation has motivated this educational revolution, and e-learning clearly has a bright future ahead (Anjut Rajput, 2019). Learning management system provide scientific approach in education to keep track of students learning process in higher education. It helps in documentation, reporting as well as administration of various teaching learning activities online. In online education large number of learners can get the knowledge virtually in their own pace. Today's generation is well familiar in the use of technologies, smartphones, and text messaging and using the internet. With the availability of smart devices and internet users can access online resources at any place and any time as per their requirements.

Flipped classroom is one of the blended learning approach where students can learn through pre-recorded lectures and during the class time students discuss with teacher about actual implementation, project work, workshops interactively that leads to active learning (Thanthawi Ishak et.al.,2020).

According to literature review, students retain 25-60% more material in online education than traditional classroom learning. Whereas students learning speed can be improved in online learning because they can learn from their own pace like reading, memorizing, revising, leave out some contents, accelerating through the concepts as per their learning style and interest<sup>[1]</sup>. There will be huge demand for personalized learning, automotive learning, catboats, gamification, and smart classrooms in coming days (www.talentlms.com, 2020).

As per ongoing research it is found that there is need to understand the students' preferences and attitude towards e-learning technologies for getting required outcome from the online education system. It is observed that most of the online education system fails due to lack of understanding or analysis of students technical resources availability, comfortless and flexibility.

To bridge this research gap, preference based e-learning system helps to make positive change in education system and that leads to students as well as teachers satisfaction in revolutionized teaching learning process.

### 1.1. COMPONENTS OF E-LEARNING

Learner's e-learning preferences are identified by evaluating various components like learning methods, e-material, discussion forum, online submissions tools, choice of video conferencing application for live lectures, selection of electronic devices, speed and availability of internet connection, time and duration for online classes, flexibility of learning management system and online assessments methods components. Fig 1. Shows components of e-learning preferences.

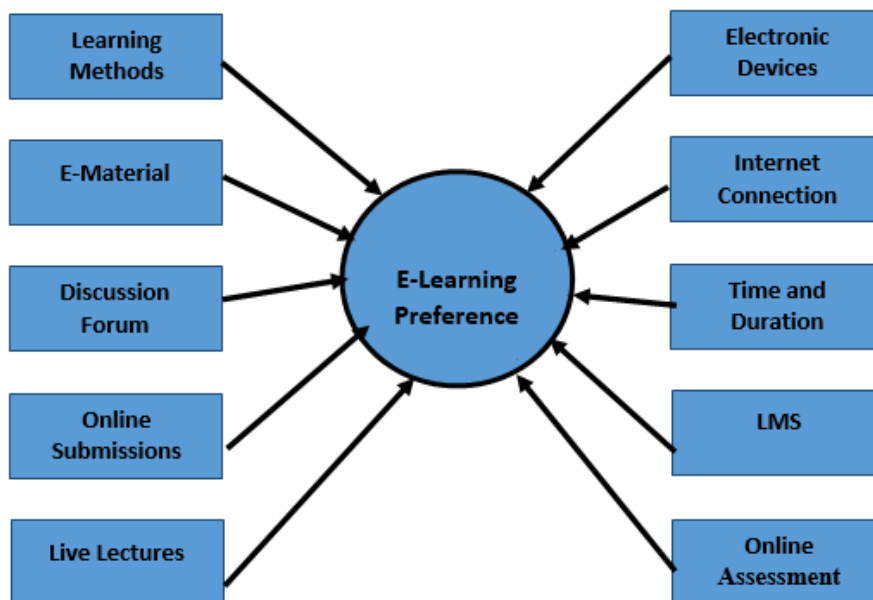


Fig.1 Components of E-learning Preferences

The choice of e-learning components is different from learner to learner. To identify availability and flexibility of e-learning components for teaching and learning is significant for outcome based e-learning that leads to better e-learning experience.

## 2. RESEARCH DESIGN

### 2.1 Type of the research

In the backdrop of above discussion the present research is an attempt to explore certain key aspects. Hence the type of the research adopted in this present endeavor is exploratory research.

### 2.2 Objectives of Study

1. To examine students e-learning preferences in higher education.
2. Comparative study of e-learning resources in higher education

### 2.3 Scope of the study

The research work is focuses on study of e-learning resources, technology used and students' preferences for e-learning platform during lockdown period in higher education. Learners and teachers preferences about e-learning resources, methods and technologies are collected from one of the leading management institute in the western Maharashtra.

### 2.4 Sample Design

Structured questionnaire designed using Google form and link were send to the 510 students. Out of these 458 respondents submitted response. Here census method is used for sample selection.

## 3. RESULT AND DISSCUSSION

Here research work is carried out by component wise data analysis of e-learning tools and techniques that described are as follows.

### 3.1 METHODS OF E-LEARNING

There are mainly two types of e-learning as synchronous and asynchronous e-learning. In synchronous e-learning teachers can use video conferencing application for live lecturing method. Where teachers can allow the students to attend lectures on stipulated time only. Here teacher can control and monitor students online by asking questions, sharing data, live chatting etc. This is one of the fruitful method of teaching and learning where teachers can get satisfaction of their teaching content. Students can clear their doubts in the live lectures interactively.

In asynchronous e-learning teachers may post study material online whereas students can download it or refer it online as per their time and convenience (www.educations.com, 2020). Common methods are used in asynchronous e-learning are prerecorded video lectures, lecture notes, PowerPoint presentations, virtual library, online discussion board, social media platforms etc. Discussion forums, assignments and online tests are useful to understand students' knowledge and interest in specific subject in asynchronous learning. As per our survey 28% students recommend for synchronous e-learning, 20% students recommend for asynchronous learning where as 52% students recommend for combination of both synchronous and asynchronous teaching learning methods.

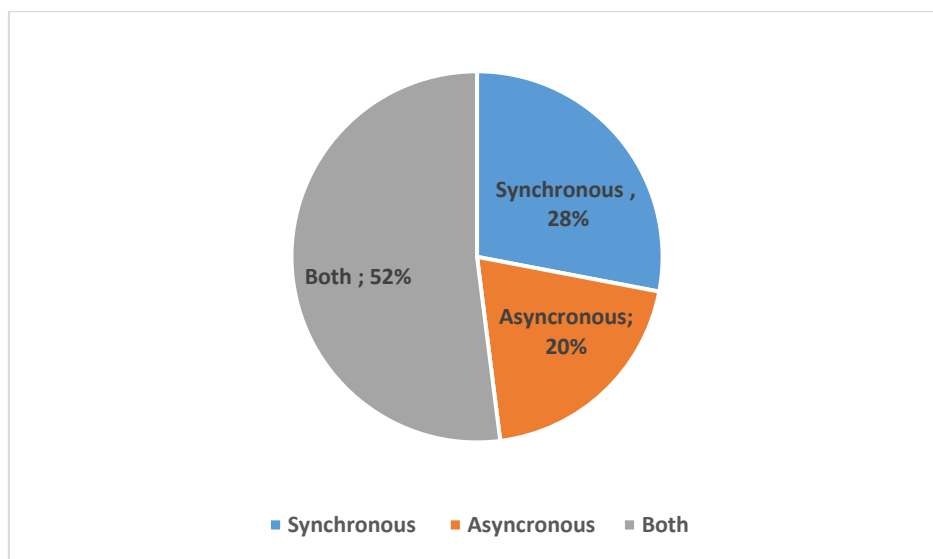


Fig.2 E-learning Methods

### 3.2. ELECTRONIC DEVICES FOR E-LEARNING

During lockdown to continue with teaching and learning process usage of smart electronic devices is the primary need for teacher as well as students. For online teaching and learning different devices can be used like desktop computer, laptop, smart phone, tablet PC etc. As survey reveals that among 25 teachers 10(40%) teachers using desktop computers, 7(28%) teachers using laptops, 2(8%) teachers using tablet PC and 6(24%) teachers are using smart phone for delivering online lectures as well as distributing e-contents.

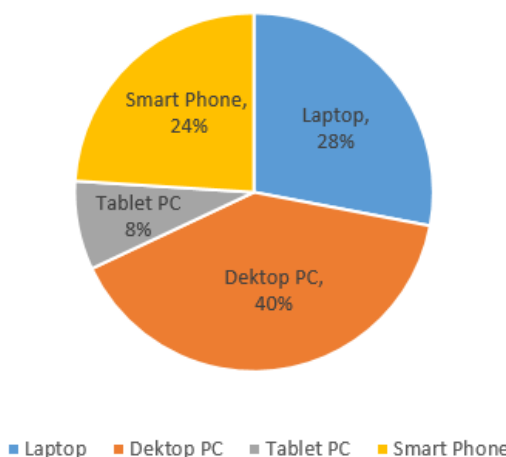


Fig.3 Teachers Using Electronic Devices for e-learning

The survey indicates that among 458 students, (283) 62% students using smart phone, (109)24% using laptops and (42) 9% students using Desktop PC, (14) 3% using tablet PC and (10) 2% don't have any electronic device for online education.

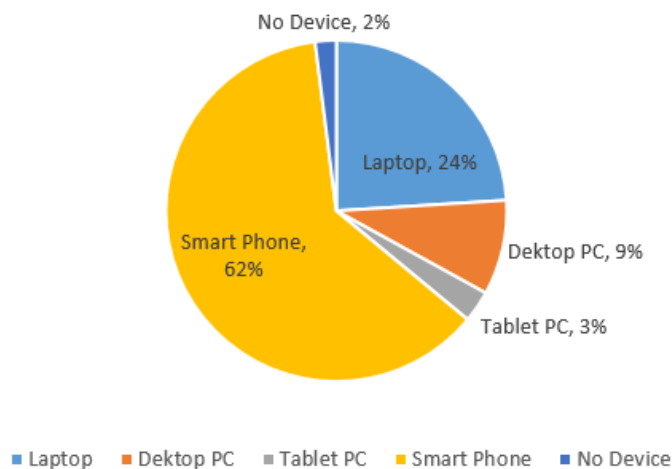


Fig.4 Students- Use of Electronic Devices for e-learning

### 3.3 INTERNET CONNECTION

To connect students and teachers virtually proper internet connection, good bandwidth, and sufficient internet data pack is necessary. Number of internet users are increasing day by day which consumes large bandwidth. During lockdown most of the schools and colleges are going online in overall globe (www.weforum.org, 2010). As per survey 48% teachers and 36% students using broadband where as 52% teachers and 64% students using Wi-Fi internet connection for online education. Whereas Internet bandwidth stability is more in fiber-optic broadband connection than wi-fi which helps for better audio video quality. It provides network speed consistency. This type of connections are less vulnerable during peak usage period.

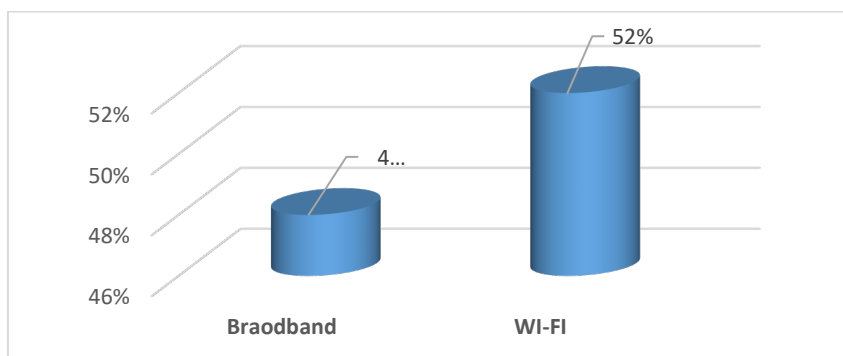


Fig.5 Teachers using Type of Internet Connection

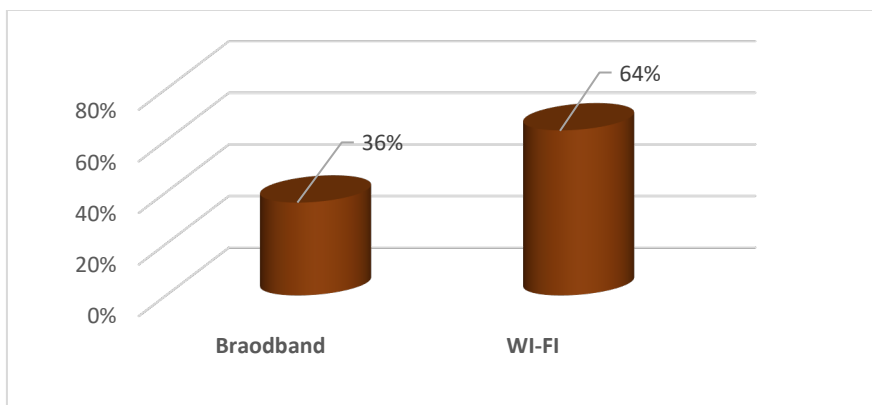


Fig.6. Students Using Type of Internet Connection



### 3.4 DURATION AND LENGTH OF ONLINE CLASSES

During online classes teachers should share content in concise complete and simple languages so individual learner actively attend the classes. As per MHRD duration of online classes should be 30 to 45 min for school students (timesofindia.indiatimes.com, 2020). As per education experts online class duration for UG and PG students ranges between 30 to 90 minutes and maximum 3 to 4 hours for 5 days in a week (timesofindia.indiatimes.com, July 2020). Student engagement is very important for outcome of online education (odishabytes.com, 2020). Proper timetable should be important and share students through Whatsup group or email. It indicate from the survey that 65% students recommend for 40 min, 30% students recommend 60 min and 5% students recommend more than 60 min as a suitable duration for online lectures.

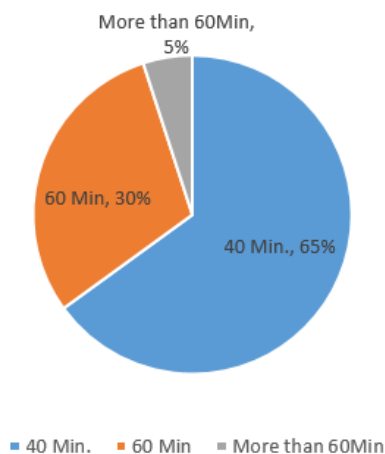


Fig.7 Students Recommendations for Duration of Online Classes

### 3.5 LEARNING MANAGEMENT SYSTEM:

Online learning management systems are web based applications are used to provide study material, online quizzes, e-assessments for students tracking, reporting, training and development. Selection of right LMS is the challenge for all institution for efficient teaching and learning during in COVID-19 lockdown situation.

Cloud based LMS does not require any installation and maintenance. Such LMS interface are responsive on mobile and user friendly with 24\*7 client support. Google classroom is a popular cloud based LMS mostly preferred by various engineering and management institutions. The institute with G-suit account under educational domain provide unlimited storage space for Google classroom where institute can restrict to join the students from specific domain that help to control virtual classroom activities.

Open source LMS require installation and maintenance from institution. Moodle is the one of the widely known LMS. Moodle community guide for how to setup LMS, provides tips for how to provide e-content and teach using Moodle. It provides various tools for teacher and student administration, student progress tracking as well as mobile application guidelines. The survey highlights that 68% management students recommend Moodle LMS where as 42% management students are recommend for Google classroom. UG students are more comfortable with Moodle than any other LMS.

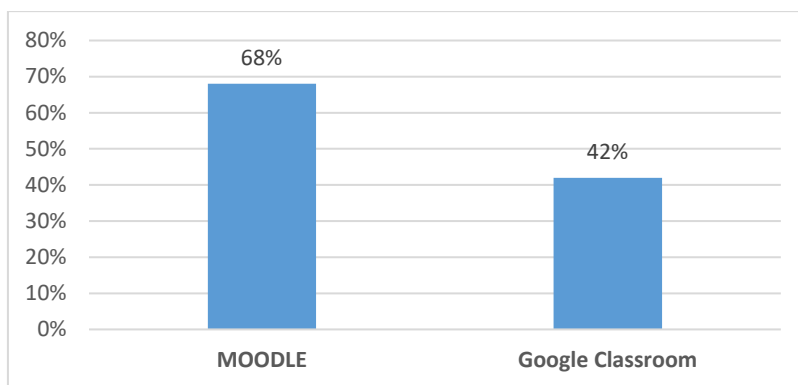


Fig.8 Students Recommendations for LMS

### 3.6 ONLINE ASSESSMENT

Due to technological advancement online assessment is one of the effective technique for student progress evaluation. During lockdown situation most of the government and private institutions promote for online assessment. As per guidelines from e-learning industry online assessment include variety of questions like MCQ, short answer, long answer, match the pair etc. Test should help to grab the interest of learner as well as covers the required course outcomes. It is found that students face stress and anxiety after examination and need to wait for a long time for declaration of results. Through Online exam it is easy to declare result immediately which help to reduce stress of student during this pandemic situation. Online exams helps increase learning interest of students by assessing the learners as per their learning styles e.g. auditory and visual learners are more focus on multimedia content rather than text or long sentences. The survey depicts that management students recommend MCQ test based online examination to save students time as well as it is possible to attempt exam with average internet bandwidth (elearningindustry.com, 2020).

### 3.7 ONLINE LECTURES

Due to COVID-19 pandemic situation most of the educational institutions continue education process through the online mode. It is real time platform where students and instructors have an opportunity for the face to face interaction virtually. It also helps to feel like classroom environment where instructor and students are online on same platform at the same time. Different video conferencing apps like Zoom, WebEx, Google Meet, and Go to Meeting etc. provide various facilities for interactive teaching, learning and online discussions. It provides raise hand (to flag or ask any question), live chatting, content sharing, reactions (to express emotions), and recording features for communication. During online lectures chat box can be used to ask questions to the students, record students' attendance, assign tasks and keep students' active as well as engaged during teaching learning process. It helps to increase teacher satisfaction as well as improve students learning level. Zoom application allowed to replicate to the traditional classroom with screen sharing, video streaming and braking classroom into different groups of interaction and discussion. Google Meet allowing for instance messaging and video calling features. These video conferencing platforms maintain log record of all participants/ students to monitor and control online activities. Today these applications enhance their security features to protect your data from unauthorized access (tophat.com, 2020). According to the survey 68% students recommend Zoom App, 24% students' recommend Google Meet app and 8% students recommend other apps for virtual lectures.

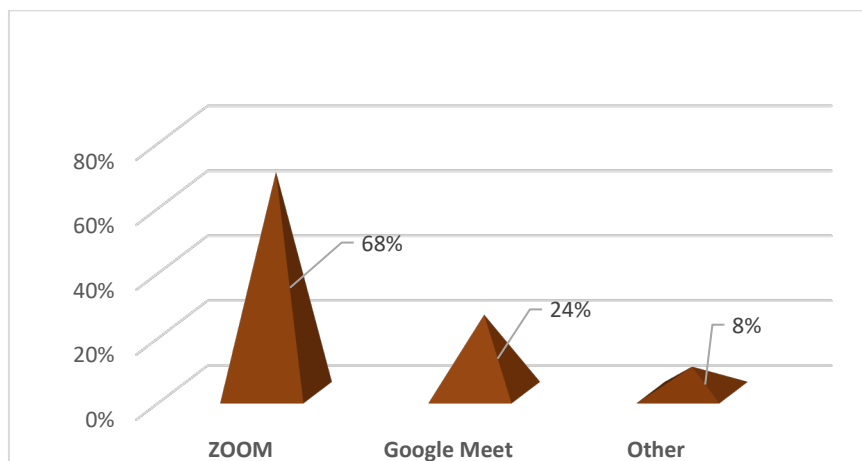


Fig.9 Students Recommendation for Video Conferencing Applications

### 3.8 ONLINE SUBMISSIONS

Due to COVID-19 pandemic situation it is challenge for education system to accept an assessment of students' assignments, practical work, and case study submission. As per UGC norms last year examination and their submission is important part to complete their academic process for partial fulfillment for providing degree. Google classroom, Google forms, Moodle LMS etc. are the different standard techniques used for collecting student's submissions online. There is challenge for storage size and security of document send over the network. Educational G-suite provide unlimited storage size, which can helps most of institute to accept large number of student's submission online in secured manner. Students has submitted their internal work through pdf, doc or image file to the respective teacher where teacher can online assess and evaluate as well as provide comments to these documents in the systematic way using LMS.

### 3.9 DISCUSSION FORUM

Discussion forum is a web based synchronous technique to engage the user in online communication. It is one of the effective social media technique in e-learning. Discussions are frequently controlled into forums, which are distinct folders each committed to specific broad discussion topics. It helps for healthy knowledge sharing activity where different problems can be discuss on one platform. Expert’s opinion and problem solving technique helps for further research and development in particular domain. In the domain based discussion forum students can post their queries as well as opinion, this activity encourage for critical thinking on specific topic. It also helps for memorization of concept that they learn through study material. This activity is the useful resource for the teacher to create interest in subject and student approach toward specific topic. Google groups is one of the popular web-based discussion forum where thousands of users posting USENET on daily basis. It is possible to create different types of discussion forums using a Web Crossing, Moodle, WebCT, Blackboard etc. web portals. This technique motivate for student centric teaching learning process where with the minimum guidance students can engage in online communication on specific topic. Each students can contribute and respond to the question which helps to enlighten students’ knowledge and analytical ability.

### 3.10 E-MATERIAL

Effective and good quality study-material is very important part in online education to engage learners in the right way. It helps to create interest of learner and learn as per their own pace. Learning material categorization as per as per learners learning behavior leads to outcome based learning. Government provide valuable contribution in online education by publishing the good quality of study material on various platforms like MOOCS, e-PG-Pathshala and Swayam etc websites. E-study material is available in the form of PowerPoint presentations, notes, eBooks etc. As per survey 72% students recommend notes pdf, 23% students recommend PowerPoint presentations and 5% students recommend eBooks for study.

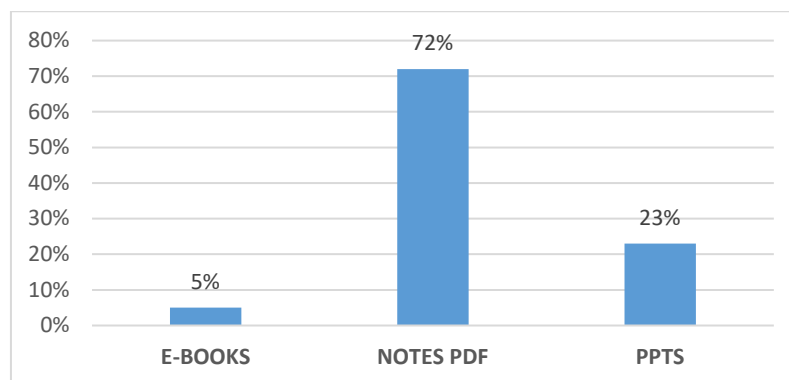


Fig.10 Students Recommendations for E-Material

### CONCLUSION

It is observed that, lack of internet range in rural area, awareness of e-learning technologies, learners attitude, lack of availability of electronic gadgets, nature of ICT tools, selection of standard tools and scientific method for online education are the important challenges in online education.

During lockdown situation to continue the teaching and learning process e-learning technologies, resources act as very significant contribution to the higher education system. It is found that Moodle, Google Classroom are the most acceptable and recommended LMS for online education. Zoom is the most recommended video conferencing application used during the lockdown situation for synchronous learning. For online lectures 40 to 60 minutes is the most recommended time duration for better teaching and learning process. During lockdown students learn asynchronously through teacher’s recorded video lectures, PowerPoint presentations and e-notes etc.

E-learning will continue to persist post-pandemic and highly impact on education system. Personalized learning, Blended learning, flipped classroom, gamification, artificial intelligence technologies, are the future of education system.

**ACKNOWLEDGEMENT:** We would like to thanks Dr.M.M.Ali Sir for his continuous support and motivation for the research. Special thanks to all respondents for their valuable time for our research data collection activity during COVID-19 pandemic situation.

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## **SURVEY OF STUDENT PERCEPTIONS OF REMOTE ONLINE TEACHING IN AN UNDERGRADUATE GENERAL DEGREE AWARDING INSTITUTION**

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### **ABSTRACT**

Educational institutions across India have been closed owing to the contagious COVID-19 pandemic. Teachers and students are compelled to adopt the virtual mode of teaching and learning. A student perception survey on remote online learning was carried out in an undergraduate college offering general degree education. The survey revealed that most students were satisfied with the quality of instruction and their learning. Students experienced internet connectivity issues which are predominant in rural areas. Findings suggest that governments and educational institutions must improve technological facilities so that students get used to blended learning, which is an approach that combines face-to-face and online learning experiences. Moreover, steps must be taken to ensure that teachers are trained to adopt the best online teaching methods to make the sessions more interactive and interesting.

### **INTRODUCTION**

Schools and colleges across India have remained shut in response to the nationwide lockdown enforced since 24th March, 2020 to contain the spread of the contagious Coronavirus. This pandemic COVID-19 is forcing educational institutions to experiment with remote online teaching and learning. Most of the Higher Education Institutes in India have resorted to online mode of instruction. Educational institutions are trying everything possible to make sure that students' education continues unabated. With the number of positive COVID cases in India growing each day, it is unlikely that educational institutions will reopen until the situation is safe. This means that educational institutions will have to continue to transact curriculum online. However, this was not the kind of experience that most people ever dreamt of. A large number of teachers who have never had any experience of teaching online are now forced to adopt this in their teaching. It is important to observe that the sudden shift from face-to-face education to online teaching, termed as emergency remote teaching, is quite different from online education (WADIA (2020)). The latter is a well-researched practice of instructional design apt for online delivery that most of the higher educational institutions in India have not adopted. The importance of a strong teacher presence and course design that is unique to and suitable for online delivery cannot be overstated for online students (Stone and Springer (2019)). If the number of COVID-19 cases continues to increase, teachers will have to consider this distinction if they need to offer online classes in the coming semester.

Many faculty members and students still believe that online education is inferior to face-to-face teaching. Despite studies to the contrary, online learning has a reputation for lower quality than face-to-face learning (Hodges et al. (2020)). That is why many students opt for off-line education even though umpteen number of excellent online education platforms like Coursera, edX, SWAYAM, and others are available and economically viable. Another reason why students prefer off-line education is inadequate computing facilities and internet access. According to a recent survey conducted by the ranking agency Quacquarelli Symonds (QS), 72.6 percent of the more than 7,500 students surveyed use mobile phone hotspots to access the internet, a solution that UNESCO classifies as "low-tech." Only 15.87 percent of students had access to the internet, and even those who did had problems with connectivity, power, and signal strength. Of those using mobile hotspots, nearly 97 percent faced poor connectivity or signal issues. This problem is severe in India, where only 30% of the population owns a smartphone. Unfortunately, these students are now compelled to learn in online mode due to the pandemic COVID-19. How can this online remote teaching impact the students' academic performance and their satisfaction levels on the course? We will have to wait few more months to get answers to these questions. A survey was carried out to understand student perceptions of online remote teaching in a prestigious undergraduate college offering general degree education in the Udupi district of Karnataka State. This paper documents student perceptions on learning satisfaction, instruction quality, challenges faced, technical issues, etc., during the emergency remote online teaching (EROT).

### **SURVEY METHODOLOGY**

A survey instrument to record student perceptions along with their background characteristics was prepared and administered to about 1500 students studying in an undergraduate college affiliated to Mangalore University

offering general degree education in the Udupi district, Karnataka State, India, using Google forms. As many as 884 students returned the forms duly filled. Analysis of the responses was carried out using an open-source R software employing descriptive Statistics.

**RESULTS AND DISCUSSIONS**

Respondents were students of a general degree awarding institution situated in Udupi District of Karnataka State. Among the respondents, 656 (74%) were women students, 21 (2.4%), 514 (58.1%), 214 (24.2%) and 135 (15.3%) students pursuing BA, B.Com, B.Sc. and BBA programs, 362 (41.0%), 142 (16.1%), 380(43.0%) are having family income less than 20,000, more than 50000 and between 20000 and 50000, 486(55.0%), 205(23.2%) and 193 (21.8%) students are residing in Rural, Semi-urban and Urban areas respectively. The average family size of students is 4.62. To a question regarding previous exposure to online courses, 675 (76.0%) said that they had not taken any online courses in the past, where as138 (16.0%) and 71(8.0%) said that they had taken one course and two or more courses. 466 (53%) students scored more than 80%, 38 (4%) scored below 60% and 380 (43%) scored between 60% and 80% respectively in the previous semester exam. With regard to the class size during the off-line classes, 378 (43.0%), 64 (7.0%), 442 (50.0%) reported that it was between 35 and 75, less than 35 and more than 75 respectively. Visual presentation of the background characteristics of students can be seen in Figures 1 and 2.

**BACKGROUND CHARACTERISTICS OF SAMPLE RESPONDENTS**

Respondents are students of a general degree awarding institution situated in Udupi District of Karnataka State. Among the respondents,656 (74%) are women students, 21 (2.4%),515 (58.1%,214 (24.2%) and 136 (15.3%) students pursuing BA, B.Com, B.Sc. and BBA programs, 362 (40.9%),142 (16.0%),382(43.1%) are having family income less than 20,000, more than 50000 and between 20000 and 50000, 423 (47.7%),407(45.9%),37(4.2%),19(2.1%) belonging to General, OBC, SC, and ST categories, 49(5.53%),791(89.28%),44(4.97%),2(0.23%) students are followers of Christian, Hindu, Muslim and Other religions, 486(54.9%),206(23.3%) and 194 (21.9%) students are residing in Rural, Semi-urban and Urban areas respectively. The average family size of students is 4.62. To a question regarding previous exposure to online courses, 676 (76.0%) said that they had not taken any online courses in the past, whereas 139 (16.0%) and 71(8.0%) said that they had taken one course and two or more courses. 467 (53%) students scored more than 80%, 39 (4%) scored below 60% and 380 (43%) scored between 60% and 80% respectively in the previous semester exam. With regard to the class size during the off-line classes, 380 (43.0%), 64 (7.0%) , 442 (50.0%) reported that it was between 35 and 75, less than 35 and more than 75 respectively. Visual presentation of the background characteristics of students can be seen in Figures 1 and 2.

*Student background Characteristics*

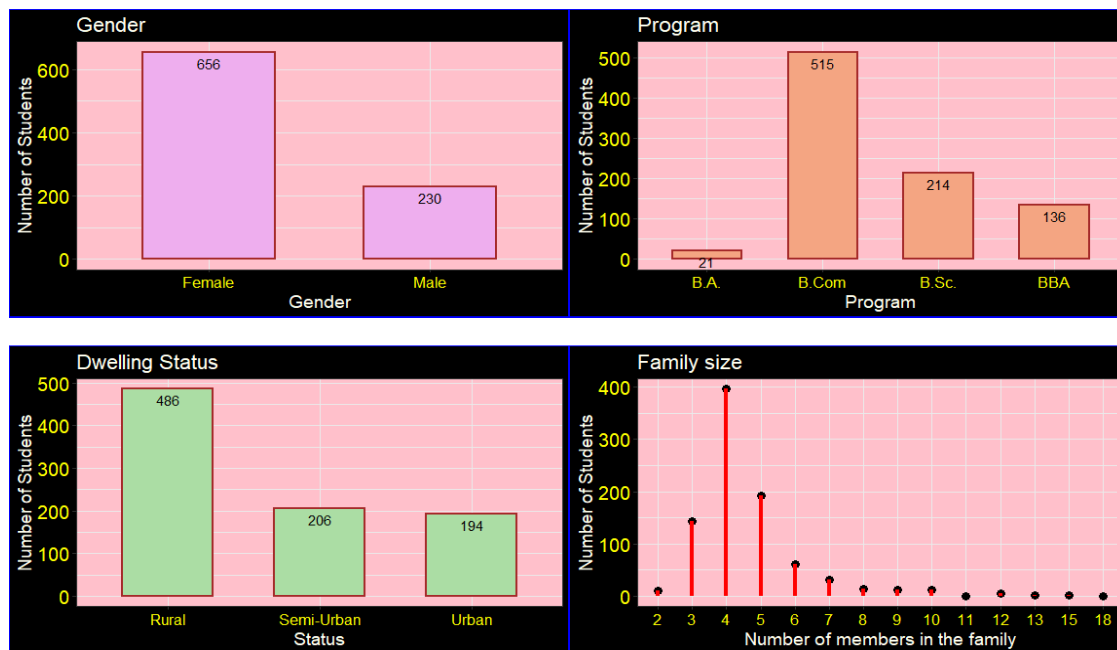


Figure 1: Student Background Characteristics

*Student background Characteristics*

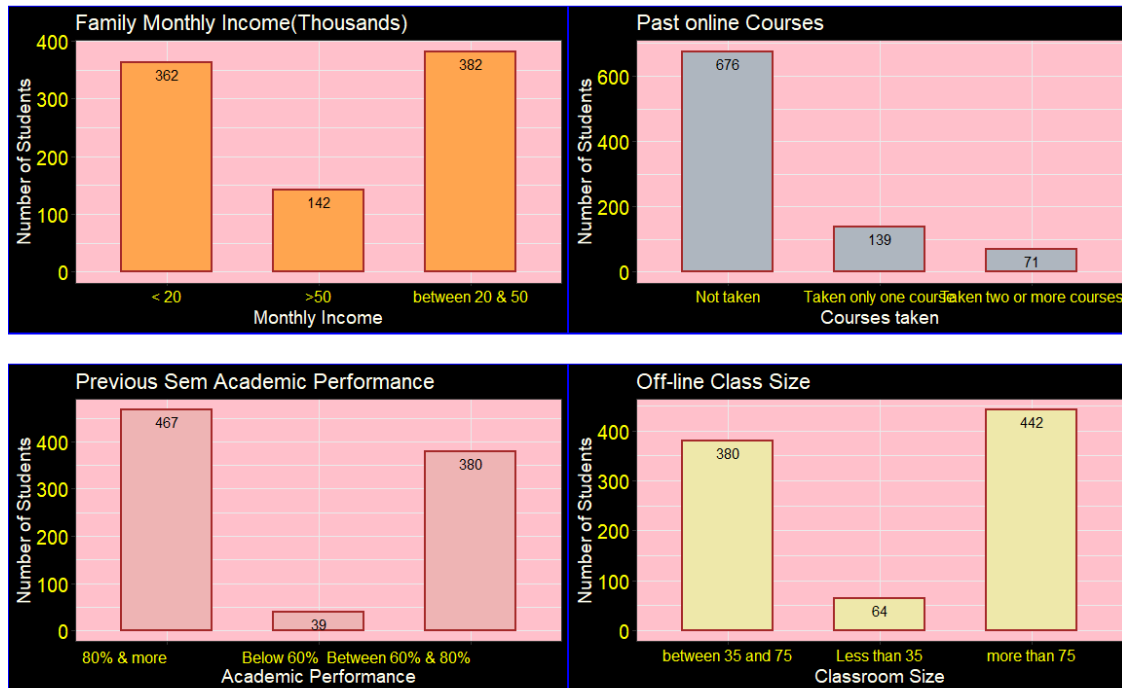


Figure 2: Student Background Characteristics

It is evident that most respondents are women students residing in rural areas religiously affiliated to Hindu religion, having a modest family income, and either belonging to general or other backwards category. Only a few respondents have previous exposure to the online class environment. Also, these students have shown excellent academic performance in the previous semester examination even though they studied in large classrooms.

**INTERNET CONNECTIVITY ISSUES**

The digital divide has long been a source of concern, referring to unequal access to technology and how people use digital resources differently. The social and employment status of individuals is often a factor in the digital divide. People from lower socioeconomic backgrounds and those living in rural areas are less likely to have access to computers and the internet. Moreover, some students may have more technical devices at their disposal than others. Uneven access can lower digital literacy rates, putting students at a disadvantage in educational settings (Gillis and Krull (2020)). Working and learning from home requires internet access. Students would be unable to participate in online classes if their internet connection was unreliable or non-existent. Some of the most common internet issues students encounter are the loss of internet or data during online classes, the inability to access study materials, poor audio or video quality, the lack of internet access in all areas of the house during peak hours, and the presence of too many concurrent users. To understand student experiences, students were asked to respond to questions such as where and which device they are using to access online lectures and whether any Internet connectivity issues were experienced that interfered with learning. Results are given below.

Out of 884 students, 804 students (91%) reported using their smartphones to tune into online lectures. The remaining have access to devices such as computers and tablets. 816(93%) students reported that they access online lectures from the comfort of their home. Fig. 3 gives experiences of students residing in urban and rural areas regarding internet connectivity issues that interfered with learning.

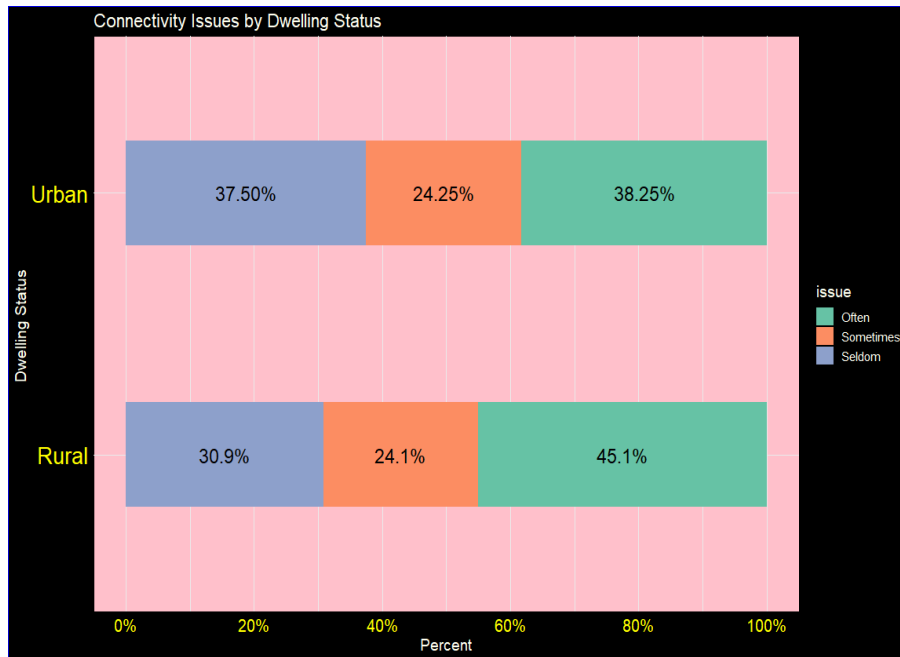


Figure 3: Connectivity Issues by Dwelling Status

We observe from Figure 3 that both rural and urban students have reported internet connectivity issues that interfered with their course participation. Still, it appears that more students are affected in rural areas.

**REMOTE ONLINE TEACHING METHODS**

To reduce the spread of the novel Coronavirus, educational institutions worldwide moved rapidly to transfer various courses from on-campus to online, making online learning (e-learning) a compulsory teaching and learning process. Putting learning materials on the internet is not the same as teaching online. Teachers must adapt content and teaching methods to the new mode of delivery to engage the students in the learning process. To achieve this, adequate expertise, skills, and ICT equipment must be ensured (Aristovnik et al. (2020)). Courses offered online in response to a crisis or disaster are significantly different from well-planned online learning experiences. Moving a course intended for face-to-face delivery to a fully online “remote teaching” environment presents several challenges, including communication, pedagogy, and student interaction. Teachers will have to prepare well in advance for online lectures improving the course content and instructional methods. Students reported that teachers have adopted live and recorded lectures, discussions, quizzes, and assignments and recorded videos when asked about pedagogy teachers have adopted in their remote online teaching. Figure 4 provides a visual representation of student responses.

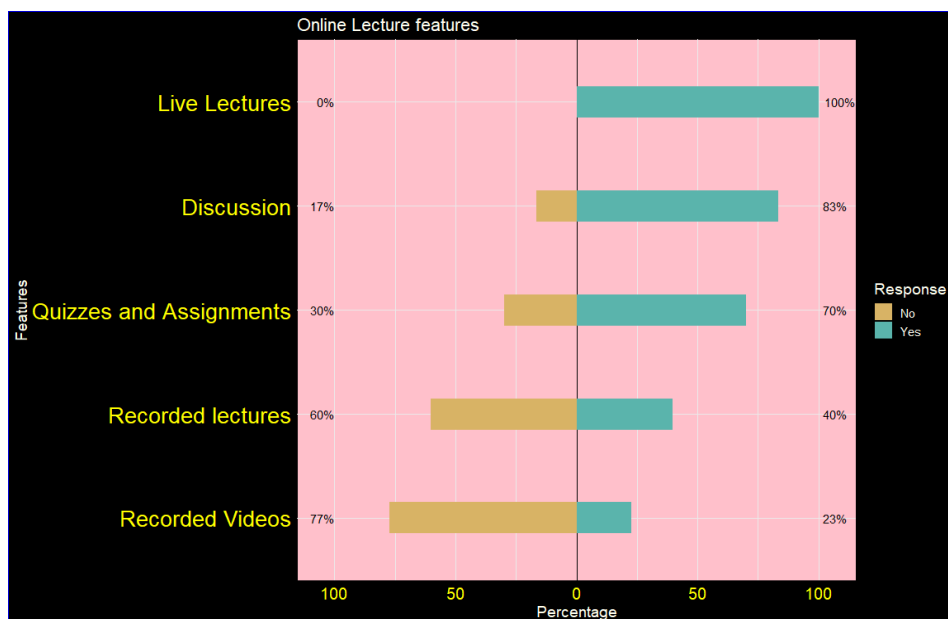




Figure 4: Online Lecture Features

Every respondent reported that teachers used live lectures for content delivery. Along with live lectures, teachers have adopted discussions, quizzes & assignments, and recorded lectures. It may be noted that only 22% of students reported that recorded videos were used by teachers.

**STUDENT PERCEPTIONS ON QUALITY OF REMOTE ONLINE TEACHING**

The survey asked students to rate their satisfaction with multiple aspects of online teaching quality, as shown in Figure 5.

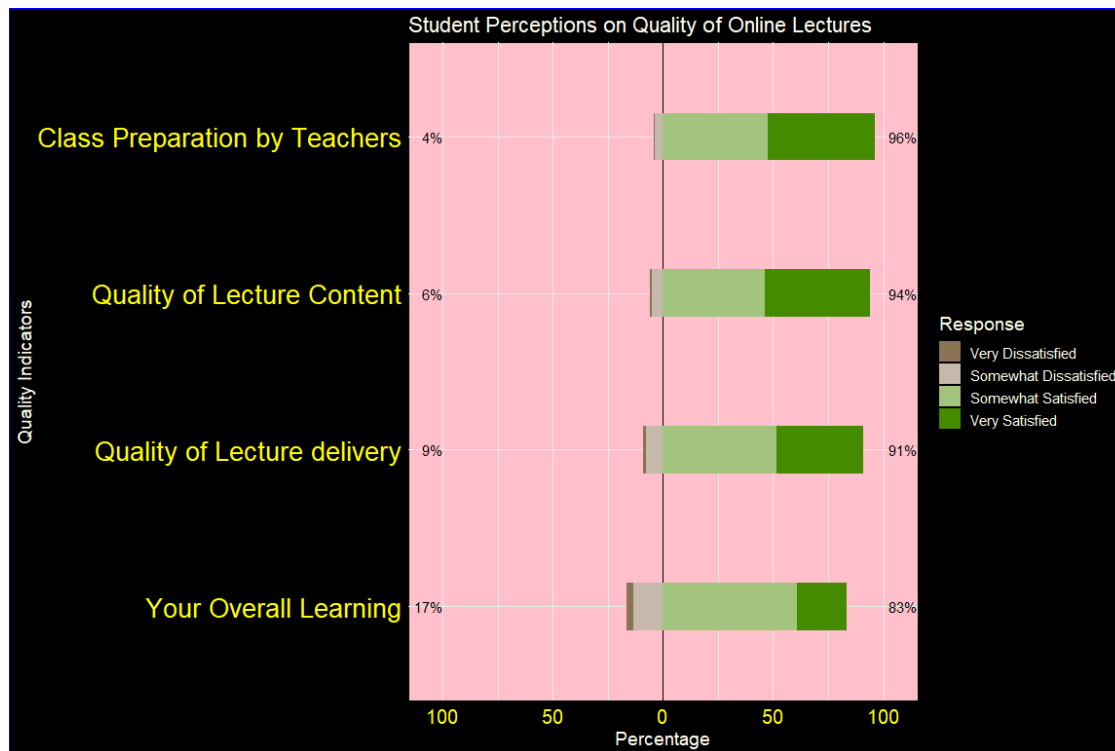


Figure 5: Student Perceptions on Quality of online lectures

More than 90% of the students reported that they are either very satisfied or somewhat satisfied with the teacher's preparation for online classes, lecture content, and lecture delivery. However, 17% of students said they are either very dissatisfied or somewhat dissatisfied with their learning in the course. It is to be noted here that students did not blame their teachers for their dissatisfaction.

**CHALLENGES FACED BY STUDENTS DUE TO REMOTE TEACHING**

As the COVID-19 pandemic has unfolded, students across the country have been exposed to remote learning for an extended period now. It almost seems like learning independently from home is the new normal. According to Gillis and Krull (2020), most students faced obstacles to learning due to the pandemic, such as distractions, increased anxiety, and a lack of motivation, particularly female and first-generation college students. Course design, learner motivation, time management, and comfort with online technologies impact the success of an online learning experience, as found in a survey by (Song et al. (2004),) (2004). Also, survey participants indicated that technical problems, a perceived lack of community, time constraints, and the difficulty in understanding the online courses' objectives as challenges. (Means, Neisler, and others (2020)), in their survey, reported that the most severe problem students faced are staying motivated when they did not have the structure of regular class routines. Internet connectivity, family distraction, anxiety, and a lack of space were found to be barriers to effective online teaching in a survey of medical students' perceptions of effective online teaching during the COVID-19 pandemic. Furthermore, these students reported a lack of motivation, difficulty concentrating, difficulty asking questions, and a lack of contact with peers during the online teaching-learning process (Dost et al. (2020), Niemi, Kousa, and others (2020)). In this study opinion of students was sought on these issues. Figure 6 provides a visual presentation of the responses. 17% of the students reported that the most severe problem is sustaining interest throughout the session. For about 16% of students finding a quiet place for online classes was a challenge.

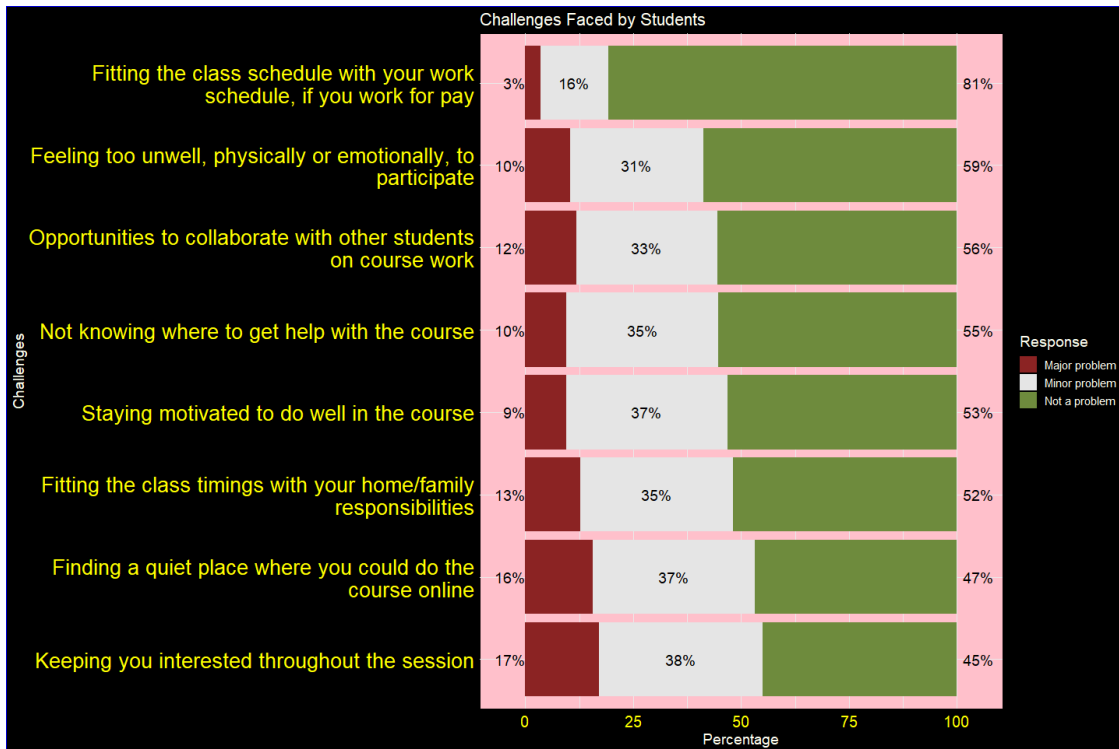


Figure 6: Challenges faced by Students

**LEARNING SATISFACTION LEVELS OF STUDENTS WITH DIVERSE BACKGROUNDS**

In a study, Loton et al. (2020) found no highly dissatisfied or poorly performing student sub-groups due to remote online teaching. According to (Means, Neisler, and others (2020)) learning satisfaction levels associated with the unplanned transition to remote instruction during COVID-19 were not uniformly distributed across college students. In this study, only 17% of students reported that they are either very dissatisfied or somewhat dissatisfied with their learning during this emergency remote online teaching (EROT). Nevertheless, an effort was made to identify which student group contained most number of dissatisfied students. Figures from 7 to 13 provide a visual presentation of the distribution of learning satisfaction levels of students belonging to various groups.

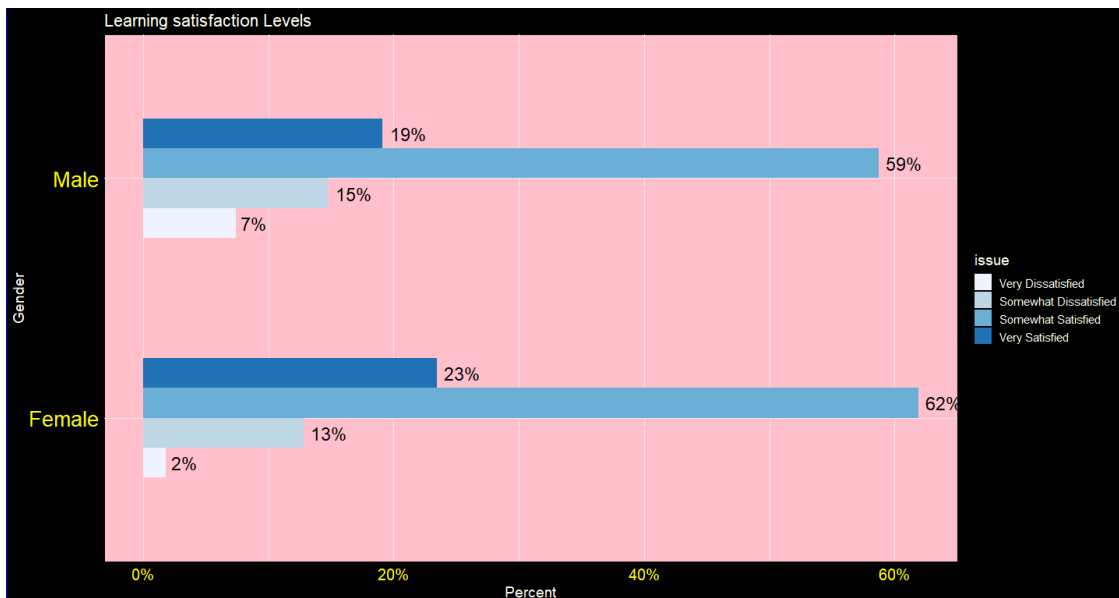


Figure 7: Learning Satisfaction levels by Gender

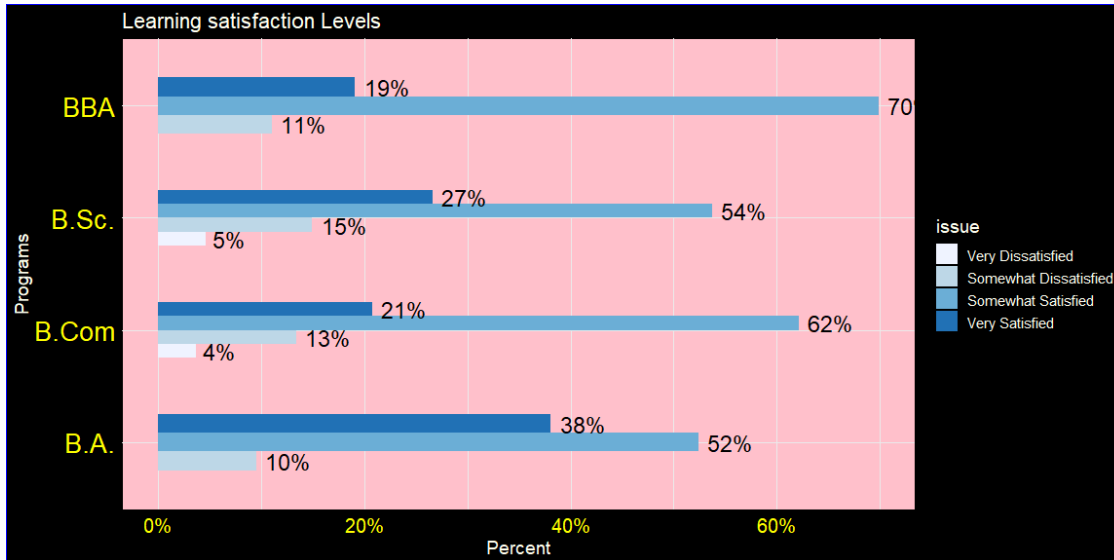


Figure 8: Learning Satisfaction levels by Program

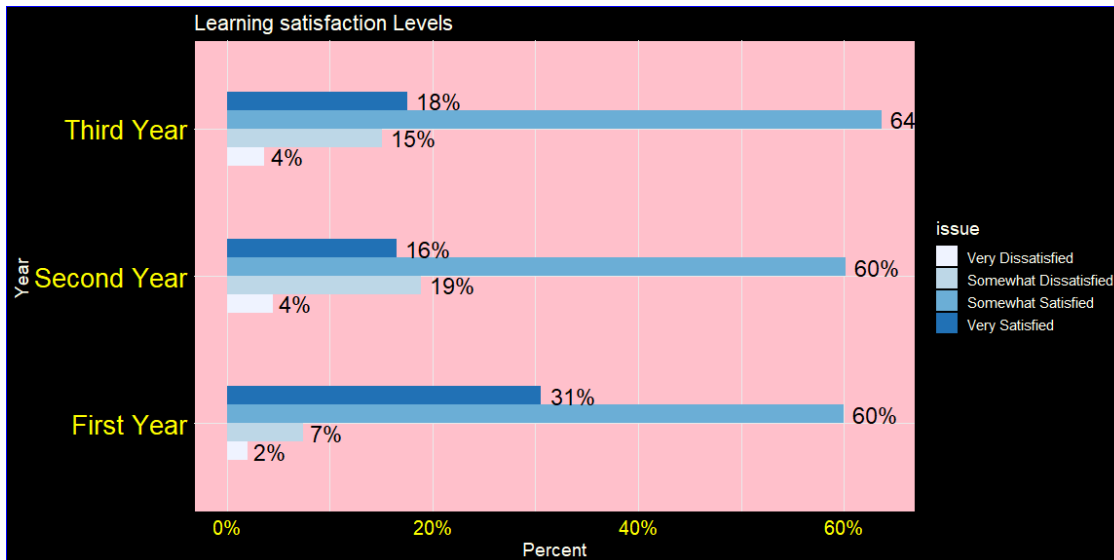


Figure 9: Learning Satisfaction levels by Year of Study

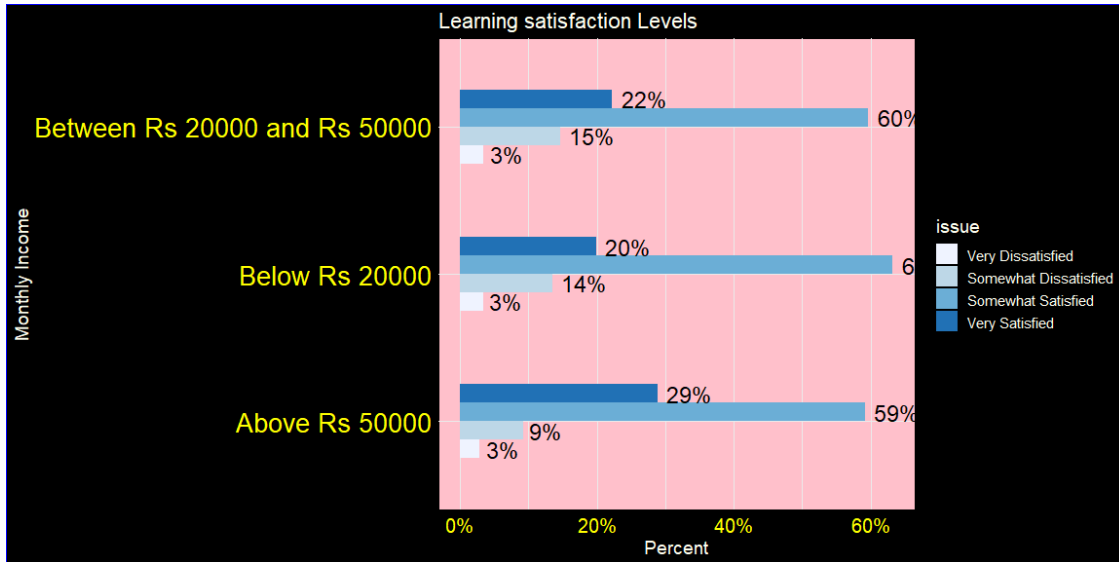


Figure 10: Learning Satisfaction levels by Family Monthly Income

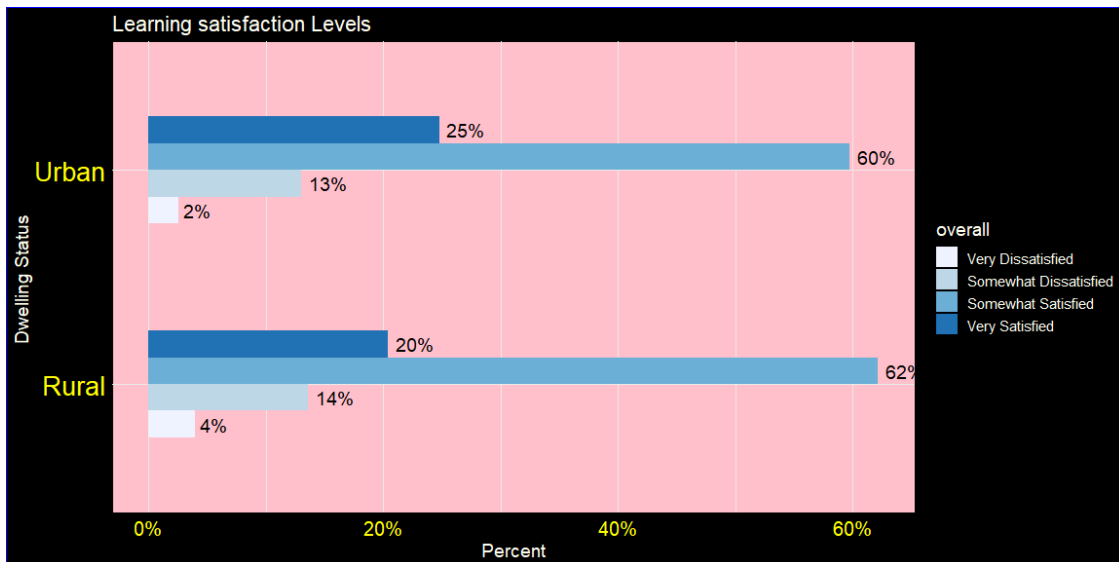


Figure 11: Learning Satisfaction levels by Dwelling Status

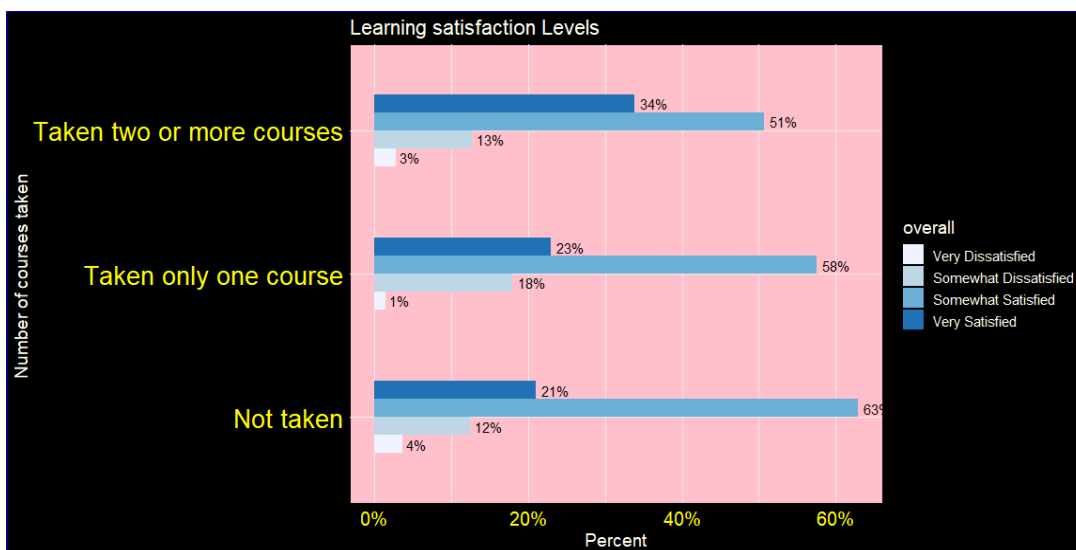


Figure 12: Learning Satisfaction levels by Online Courses taken previously

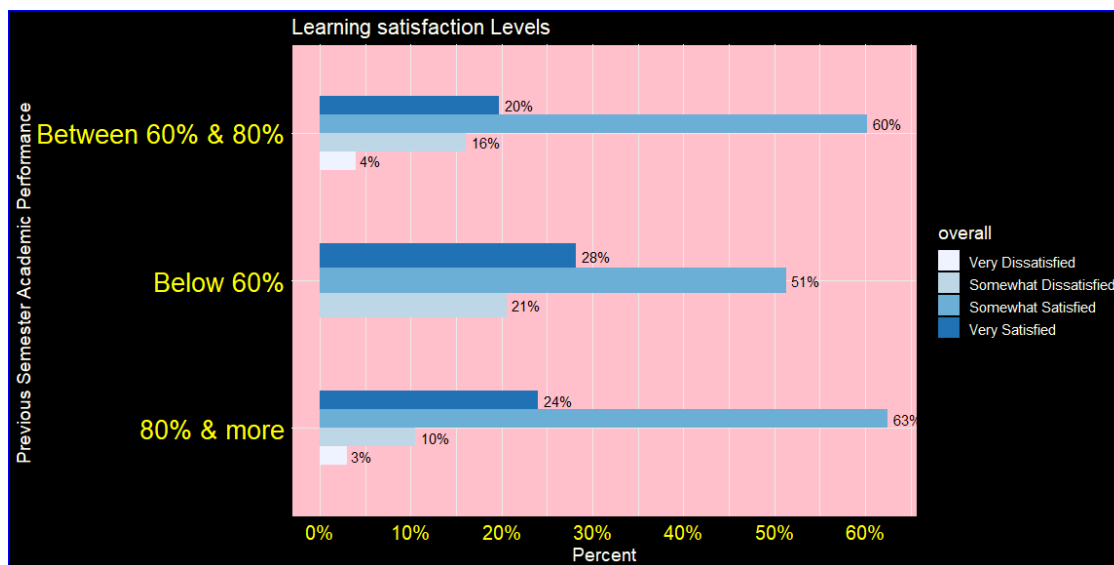


Figure 13: Learning Satisfaction levels by previous semester Academic Performance

Following observations can be made from these figures.

- More number of women students (23%) very satisfied with EROT when compared to males (19%)\*
- More B.A. stream (38%) students are very satisfied with EROT compared to other streams. This may be due to the fact that B.A. programme has subjects that are theoretical in nature.
- More Freshers (30%) are very satisfied with EROT in comparison to their seniors. This may be because these students never experienced off-line classes in the college.
- A higher percentage of students belonging to high-income groups (29%) and students living in urban areas (25%) are very much satisfied with EROT. This might be because of the better facilities these students have in accessing online classes.
- A very significant point to be noted here that a larger percentage of students who have taken two or more online courses previously (34%) are very much satisfied with EROT.
- It is rather surprising to observe that a large percentage of students with not-so-good academic performance in the previous semester (26%) have expressed satisfaction with EROT.

## CONCLUSIONS

Most of the Higher Education Institutes in India have resorted to online mode of teaching in response to the closure of educational institutions due to the pandemic Covid-19. In a way, teachers and students are compelled to adopt an online mode of teaching and learning. This survey on “Student perception on emergency remote online teaching” was carried out in an undergraduate college offering general degree education affiliated to Mangalore University. It was found that the majority of students are using smartphones from their homes to access online classes. Both urban and rural students experience internet connectivity issues, but the problem is more prevalent in rural areas. Teachers have been using various methods such as live lectures, discussions, quizzes and assignments, recorded lectures, etc., for transacting curriculum online. More than 90% of the students reported satisfaction over the quality of instruction. This shows that teachers are doing a great job in this institution and prepared themselves for the online mode of teaching. Subjects that are theoretical in nature can be taught effectively using online mode of teaching. A smaller percentage of students reported that they have problems sustaining interest throughout the session and finding a quiet place to access online classes. Analysis of students' learning satisfaction levels belonging to various groups revealed that a larger percentage of students who have taken online courses previously expressed a higher level of learning satisfaction. This suggests that the promotion of online courses among the students is essential so that learning is not disturbed in situations that warrant educational institutions' closure. The above findings suggest that Governments and educational institutions should develop technical infrastructure so that students become accustomed to blended learning, which is a way to integrate face-to-face and online learning experiences. Moreover, steps must be taken to ensure that teachers are trained to adopt the best online teaching methods to make the sessions more interactive and exciting.

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## THE IMPACT OF ONLINE LEARNING ON LEARNERS' EDUCATION AND HEALTH

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### ABSTRACT:

An unexpected outbreak of COVID-19 made everyone perplexed and forced all the stakeholders of the education system to explore the ways to overcome the barrier to compensate for academic losses of learners. The best remedy to resolve this problem was emerged as 'On line teaching-learning mode'. Need has arisen to study the accessibility and effectiveness of this method and also the impact on physical and psychological health of learners. The paper presents the findings of national level online survey in which 138 participants of different age groups participated. Analysis of responses revealed that learners' concentration got distracted due to disturbances like network accessibility and surrounding noise. Long-time handling of E-gadgets, lack of personal interaction with teachers and peers caused severe physical and psychological discomfort. The survey confirmed that though online teaching-learning mode emerged as an option for traditional classroom teaching to keep educational system running during this adverse period of pandemic, it has got several limitations and adverse effects also. So this could be a temporary solution for time being to shoulder and fulfilment of academic responsibilities but would never be a permanent replacement of traditional mode of teaching-learning.

**Keywords:** COVID-19, on-line learning, learner's education, e-gadgets, physical and psychological health.

### INTRODUCTION:

The whole world is experiencing the consequences of COVID-19 pandemic situation. With the outbreak of the novel corona virus, all sectors of the society came to a standstill worldwide [Gonzalez et.al, 2020]. One of the fundamental pillars for society building is strong education system. Education is a process of disseminating knowledge and skill to produce researchers, academicians, professionals and entrepreneurs etc. Education society, also suffered a lot due to an unanticipated interruption in the conduction of prescribed curriculum. Large impact on education is being observed all over the world. The situation has created a challenge in front of Ministry of Education, UGC and even with the stakeholders such as governing bodies of schools, higher education institutes, teachers, students and parents to reframe and adopt the new education system. The reframed system should be more agile, flexible and resistant to such global crisis. Indian government is providing a platform to facilitate learning and also coming up with the solutions like revised academic calendar, new evaluation reforms etc. to make up for the loss of academic hours due to COVID-19 pandemic. Crisis has reinforced the entire education system to recalibrate its actions and delivery channels [Cathy, 2020]. Pandemic situation has enhanced the role of remote working, e-learning, video streaming, etc. on a broad scale [Ebner et.al. 2020]. The learning mode has shifted from offline to online. This transition has impacted not only the teachers who have to adopt this new method but also the students who have to adjust to a new learning environment. Several recommendations have appeared to help teachers in the process of online instruction [Garcí'a-Peñalvo et.al., 2020]. Since last twelve months this new mode has been adopted by educationalist, teachers, learners and parents. But really a need has arisen to study the accessibility and effectiveness of on-line learning methodology.

### LITERATURE REVIEW:

#### Paradigm Shift of Teaching-Learning modes:

The traditional method of teaching is classroom teaching using chalk and black board has been described as a theoretical model for academic progression of South African students' from pre-entry to university level [Jama Mpho et.al.,2008]. Over the years change in the teaching-learning mode is seen due to advancement in the electronic technology. Moreover, stress was given on enhancing academic and social skills of learners.

Experimental, participative and ICT based teaching was emphasized by UGC for senior colleges since last decade. Benefits of integrating multimedia in the classroom, giving learners' the opportunity to communicate and share

information, organize their ideas, and express opinions while preparing a project or conducting research through online experience was reported in [Alismail, 2015]. The positive effects on academic performance and creativity was put up in [Banihashem and Kazem, 2015; Manya et al., 2018]. But still these methods were supportive to traditional black-board teaching till last 5-6 years. ICT based teaching was not accepted wholeheartedly as it was assumed that this system lacked the human element required in teaching-learning process [Jena, 2020]. However, with the rapid progress in technology and the advancement in learning systems, since last 5-6 years, it has been embraced by the masses. Major advantage of it is flexibility with respect to time and space. E-learning is a powerful tool which provides direct access to learners to get information and knowledge by themselves and enhance their creativity [Bao, 2020; Somayeh, 2016]. In e-learning, learner can access the content again and again till all their doubts and concepts get cleared.

During covid-19 pandemic situation, a paradigm shift in teaching-learning mode was observed and now online education has become a new normal. Stakeholders don't have any option other than adopting this new methodology. Online learning is termed as electronically supported learning that uses the Internet for teacher-student interaction and for the delivery of prescribed educational curriculum and related class materials.

### **Impact of Online Learning:**

In recent months, many studies have been performed analysing the advantages and challenges of online learning. Some of them have reported positive impacts of online learning on flipped classroom [Tsai-Fa, 2020]. The necessity of the development of adequate tools is must for evaluation and self-evaluation of learners in order to guarantee good performance in e-learning environments [O'zyurt & O'zyurt, 2015]. It has become more essential especially in the COVID-19 pandemic. Different stakeholders have their own experiences and are facing various problems with online learning mode. But most affected stakeholders are learners. Learners have to sit at one place with electronic gadgets working on internet connectivity for hours. They have to be attentive fully to grasp the knowledge delivered by the teachers. Literature survey shows that long-time use of electronic devices such as desktop computers, laptops, mobile phones etc. are harmful to one's physical and mental health [Hunt & Eisenberg, 2008; Vadim et al, 2013]. Electromagnetic waves emitted during the use of E-gadgets affect the eyesight and damages organ. Internet addiction of teenagers has also been addressed and even suggested remedies to reduce the usage time of internet access [Ramane & Kottapalle, 2016]. However online learning mode have forced the learners to use the E-gadgets for hours irrespective of age. Due to weak interpersonal actions, alienation from real world etc. learners also face many psychological problems [Sahu, 2020]. Sudden change from traditional to digital education mode hassled to a kind of panic situation in stakeholders. In this perspective, the present paper studied the effect of online learning on learners' health and also tried to address the effectiveness of online learning mode.

### **OBJECTIVE OF THE STUDY:**

1. Effectiveness of online teaching learning process
2. Effect of Online learning on learner's physical health
3. Effect of Online learning on learner's psychological health

### **METHODOLOGY:**

The research findings are based on quantitative analysis of an online survey-based study of 138 school and college students studying at various parts of India. The survey was carried out of main stakeholders i.e. parents and learners of various educational level from KG to UG. Focusing on the objectives a questionnaire was prepared for data collection. The parameters focussed were:

- Accessibility and durability of gadgets required for online classes
- Problems encountered during online lectures such as disturbance of surrounding, internet connectivity etc.
- Effect on physical health
- Effect on Psychological health
- Resources used for content delivery
- Grasping of contents delivered

The data was collected from total 138 students and parents from different states of India like Haryana, Madhya Pradesh, Chhattisgarh, Maharashtra, Karnataka and Tamil Nadu. The students of different age groups were selected for the survey. The figure 1 shows the number of wide range of percentage responses from pre-primary classes to degree students of different discipline. The figure 2 represents the gender wise % responses (55% male



while 45% female). Parents having different social back ground were considered. In the data analysis it was observed that 95% parents were from urban area, highly qualified and holding higher position at the workplace.

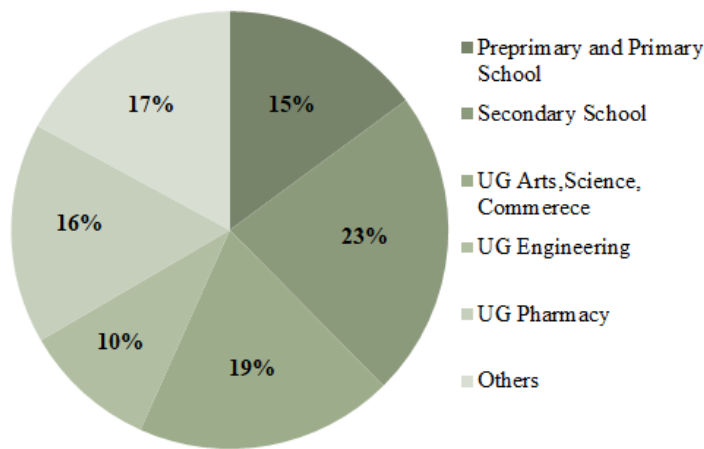


Figure 1: Range of responses

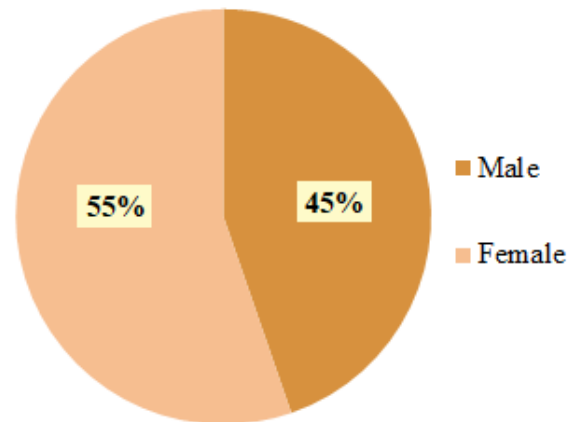


Figure 2: Gender wise % response

**RESULT AND DISCUSSION:**

The following table represents the findings of the survey.

**Table 1: Analysis of Responses**

Sr. no.	Question	Options	Response (%)	Findings	Interpretation
1	E-gadget used for online learning	Desktop	18.1	Almost ¾ learners i.e.(76%) are using mobiles and ½ learners i.e.(50%) use laptops	Mobile phone has smallest screen size as compared to other E-gadgets. It increases the severity of computer vision syndrome problem.
		Laptop	49.3		
		Mobile phone	76.8		
		Tablet	7.2		
2	Daily exposure duration to the E-gadget	Less than 2 hours	26.3	Mostly daily usage duration is 2 to 4 hours	The time period of the use of E-gadget for teaching -learning is moderate
		2 to 4 hours	41.6		
		4 to 6 hours	19.0		
		6 to 8 hours	8.8		
		More than 8 hours	4.4		
3	Resources used for delivery of online lectures by teachers	PPTs	54.3	Teachers are smartly using all the available resources	In a very short span, the teachers have adopted the new system and effectively preparing own resources, using available resources for delivering the curriculum contents
		Live lecture	62.2		
		Available audio-video content	57.2		
		Other	5.6		
4	Is illustration of the topic clearly delivered by used resources?	Yes	87.7	Teachers are effectively delivering the content	Stakeholders are satisfied with the delivery methods of the teachers
		No	12.3		
5	Are the online lectures more	Yes	29.0	Most of the stakeholders are	As online teaching is implemented suddenly without any prior training or
		No	46.4		

	comfortable and interesting than traditional class-room teaching?	May be	24.6	not comfortable with online teaching	experience, comfort zone of stakeholder's is less as compared to traditional class-room teaching.
6	Is there any teacher-student interaction during online lectures?	Yes	18.8/19	Teacher-student interaction is less	Use of virtual media for conduction of online teaching leads to less interaction.
		Rarely	31.9/36		
		No	49.3/45		
7	Reasons for distractions during online lecture, if any	Poor internet connectivity	78.3	Almost all are facing lot of disturbances during lecture time	Distractions in the online lectures divert the attention of students from learning and affect the concentration.
		Family interactions	52.2		
		Visitors	19.6		
		Intervention by siblings	29.0		
		Social interaction in surrounding	27.5		
		Not at all	7.2		
8	Are learners conversant with handling of E-gadgets?	Yes	50.4	½ learners are used to the gadget while ¼ learners have never used it before.	Further analysis of responses reveals that the college students are conversant with E gadgets while school children are facing the problem.
		No	25.5		
		May be	24.1		
9	Does online learning putting children in isolation?	Strongly Disagree	17.4	Almost ½ respondents are afraid that children will face isolation	Virtual media restricts one-to-one interaction between peers and teachers. As human beings are social animals, lack of face to face interaction may put the learners in isolation.
		Disagree	5.1		
		Neutral	26.1		
		Agree	41.3		
		Strongly agree	10.1		
10	Is online learning helpful in holistic development of children?	Strongly Disagree	5.1	Mixed opinion is observed.	Majority can't comment on holistic development of learners at this early stage.
		Disagree	29.9		
		Neutral	42.3		
		Agree	21.9		
		Strongly agree	0.8		
11	Do learners face any computer vision syndrome?	Tiredness of eyes	55.8	More than 83% of learners are facing some or other ophthalmologic al problems	The E device emits the electromagnetic light which causes the severe damage to the eyes. Due to continuous staring at screen mostly facing the computer vision syndrome problem.
		Watering of eyes	26.1		
		Redness/ Dryness of eyes	29.7		
		Blurring of vision	21.7		
		Double vision	5.8		
		All of above	21.7		
		Not at all	16.7		
12	Do learners experiencing any physical stress due to online lectures?	Headache	31.2	Physical stress is clearly seen	E devices cause severe effect to learner's health
		Backache	23.9		
		Neck pain	34.8		
		Shoulder pain	13		
		All of above	28		
		Not at all	23.9		

13	Is learner experiencing any psychological pressure?	Discomfort	26.1	Most are facing Psychological issues	The sudden unexpected stressful situation and changed delivery mode created psychological pressure amongst the stakeholders.
		Irritation	22.5		
		Fatigue	18.1		
		Sleeplessness	23.2		
		All of above	16.7		
		Not at all	27.5		
14	Is respondent happy with online learning system?	Yes	25.6	Only ¼ i.e. (25%) learners are happy with online learning system	Traditional classroom teaching accelerates the student’s physical as well as mental progress. Online teaching-learning exactly lags here so stakeholders are not happy with this method.
		No	43.2		
		May be	31.2		
15	Should traditional class room learning be replaced by online teaching?	Yes	18.1	Stakeholders prefer class room teaching over online mode	Due to shortcomings of online learning, stakeholders prefer this method as a temporary solution. and not as a permanent replace classroom teaching
		No	64.5		
		May be	17.4		

**FINDINGS:**

**A) Effectiveness of E learning:**

One of the fundamental objectives of the study was to study the effectiveness of online teaching-learning methodology.

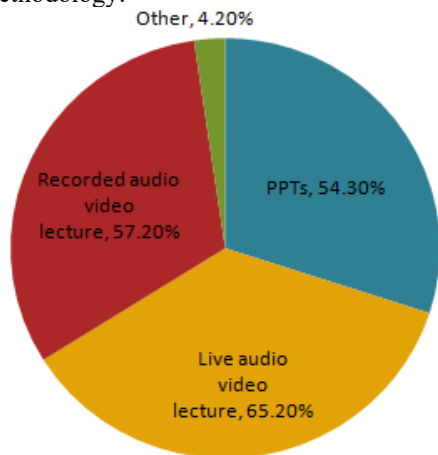


Figure 3: Proper illustration of topic

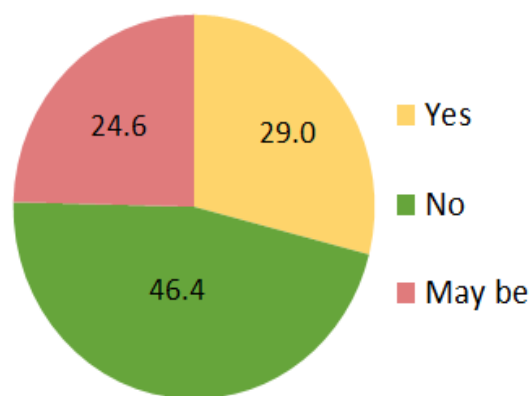


Figure 4: Effectiveness of E-lectures

In the era of technology, a lot of good quality e-resources are available easily. Teachers are trying their level best to deliver the curriculum in an effective manner either by using these resources or creating their own. Though stakeholders are satisfied with the illustrations of content, they are not willing to have it as a permanent teaching methodology. Major stakeholders of education system i.e. teachers, students and parents would like to continue with the conventional classroom teaching.

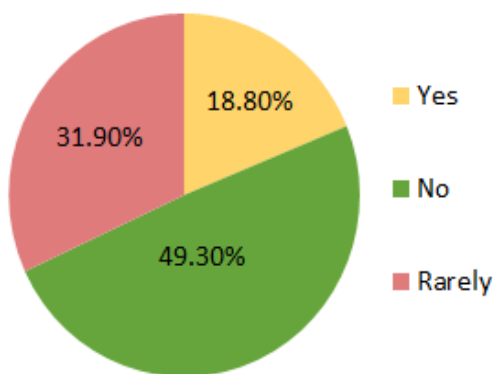


Figure 5: Interaction of teacher with students

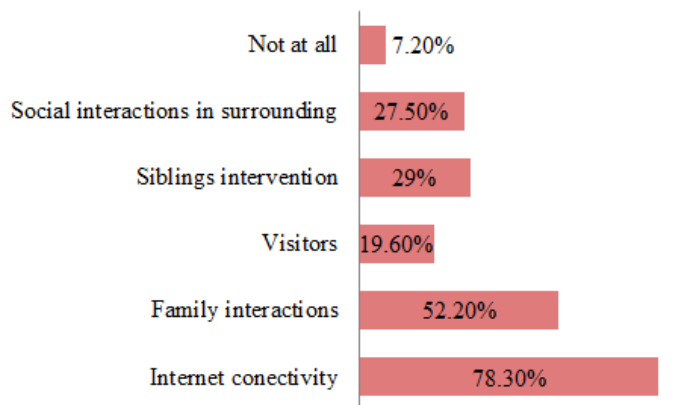


Figure 6: Occurrence of distractions

Online mode of teaching and learning is not as much effective as traditional teaching because of following reasons:

- Online learning demands E-gadgets and internet connectivity. Availability, accessibility, handling and affordability of these are the major issues of concern.
- Disturbances due to surroundings/loss of connectivity distract the learners' concentration.
- Lack of face to face communication between teacher and student.
- Lack of peer to peer communication.
- Education is more fruitful under the guidance and supervision of teachers for growing children and teenagers.
- Schools/Colleges are the miniature of our society which focuses on overall development of students through different academic, research, cultural and social outreach activities under the guidance/supervision of teachers.
- Teachers got short span for preparation and lack in online teaching experience.
- In traditional classroom learning important teaching tools are teachers' facial expressions, body language and voice. However, in online teaching, voice modulation becomes an important tool which should be used appropriately to slow down their speech to allow learners to capture key knowledge points.

**B] Effect of Online learning on physical and psychological health of the students:**

Another objective of effectiveness of online-learning was to study the effect of online learning on learner's health.

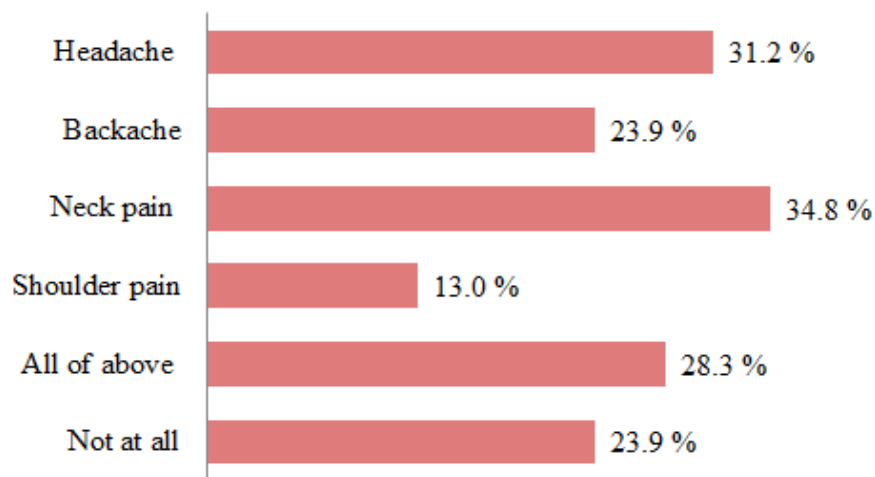


Figure 7: Physical stress during E-lectures

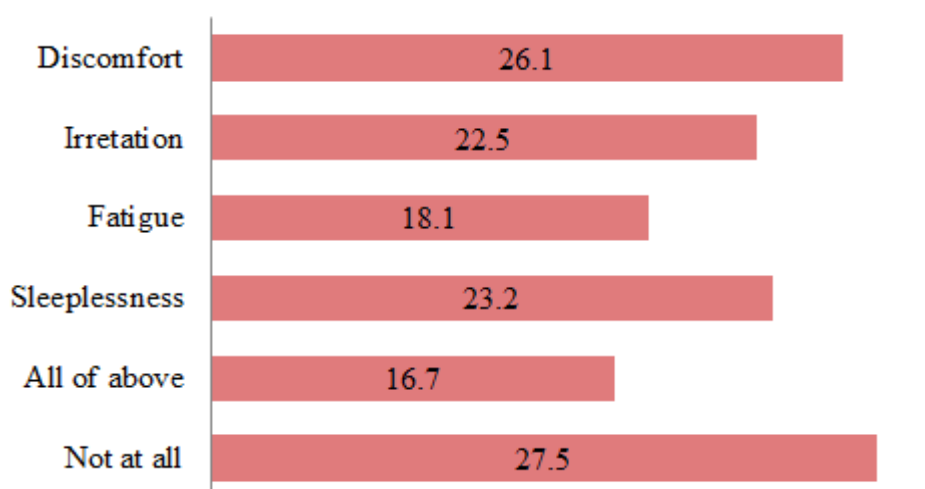


Figure 8: Psychological pressure experienced

It was found that in online mode prominent physical health issues like computer eye syndrome, headache, backache, shoulder pain and neck pain etc. were prominent. At the same time psychological pressures like discomfort, irritation, fatigue and sleeplessness were also experienced by the learners. As human beings are social animals, for the overall physical and mental growth social acquaintance is necessary. Thus health related issues

along with isolation fear associated with online learning merely helpful to the holistic development of the learner. If it continues for a long, increased physical and psychological pressure is surely going to cause severe harm to the learner's health in near future.

### CONCLUSION:

The unexpected outbreak of COVID-19 has made massive disruptive shift from traditional classroom learning to online learning in short span. Findings of survey showed that in spite of being flexible and comfortable methodology, online learning is less interesting and not much appreciated by stakeholders for various reasons. Moreover, the issues related to E-gadgets and internet connectivity interrupts the teaching-learning and thus productive time is wasted in resolving the related issues. Thus if online learning is to be continued for a long time then there is a need for revised standard SOP for conduction of online lectures. An elaborate teaching plan of complete online course along with teaching materials such as audio and video contents must be ready. The most important is learners' attitude towards learning should be changed. Online learning should be combined with the offline self-learning effectively. When learners are self-isolated at home, they must have self-discipline, suitable learning materials and good learning environments. Before COVID 19 pandemic, the role of parents in students learning had been minimal. But pandemic crisis has put the onus on parents to ensure that learning continues at home. More efforts are required to create passion for learning, way of thinking and study habits among the learner which would help them to grow with a better aptitude.

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## TO BLOG OR NOT TO BLOG? A STUDENT DILEMMA FOR INTERACTIVE LEARNING IN HIGHER EDUCATION INSTITUTIONS IN MAURITIUS

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### ABSTRACT

This article examines the use of blogs by students in higher education institutions (HEIs) in Mauritius as a learning tool. Blogging has proved to be a successful medium for reflections and interactions among students in many contexts. This study looks into the extent to which students use blogging for online interactions and the reasons why they tend to blog or not to blog. Online survey questionnaires were administered to 600 students from three public HEIs offering courses in blended mode, namely the University of Mauritius, the Open University of Mauritius and the Centre for Open and Distance Learning of the Mauritius Institute of Education. The response rate was 72.2%. 24 students and 8 lecturers from three HEIs were selected by using purposive convenience sampling for focus group discussions and individual interviews respectively. The survey revealed that only 29.3 % of students use blogs in their learning and that 40 % of them have never used blogs. It was found that students in Mauritius have a cultural inhibition to share their views, feelings, experiences and knowledge among themselves online though they use social networking sites, the curriculum is too structured, they are cognitively overloaded with too much information through e-learning and lecturers are not prepared to adopt blogging as a teaching tool.

**Keywords:** blog, online interactions, higher education institutions, blogging, e-learning

### INTRODUCTION

Blogs is a contracted form of 'web-based logs' or 'weblogs'. They are basically online journals in which a person posts numerous chronological and the most recent entries on a particular topic, which is of particular interest to him/her, and other persons may freely express their comments or views (Farmer, Yue & Brooks, 2008). In the process of blogging, people write, read, comment in and out: this is the rhythm of blogging (Garcia, Moizer, Wilkins & Haddoud, 2019). There is thus a conversational process through feedback that enhances learning. More importantly, blogs may be used as reflective as well as interactive devices (Deng & Yuen, 2009), hence promoting them as a form of learning enabler for learners in higher education, particularly for those in open education. Indeed, blogs are one of the most frequently used forms of social media in higher education (Al-Qallaf & Al-Mutairi, 2016). They are preferred because of the perceived benefits and opportunities they present for improving pedagogical practice and student engagement through interactions (Veletsianos, 2020). Examples of network log services are WordPress, Livejournal, Blogger, Tumblr, Typepad, and SquareSpace (Mikoluk, 2013).

Blogging is an innovative internet technology that is used in many universities, by faculties and learners, for teaching and learning purposes. Like any other technology, blogging allows supporting instruction, particularly in open education in which learning may turn out to be too individual and passive. Blogging facilitates the creation of a community of inquiry in which collaborative learning may facilitate cognitive, social and teaching presence (Pifarré, Guijosa & Argelagos, 2014). Blogging allows the interaction of these three types of essential presences for meaningful learning, through collaborative writing tasks (Garrison & Akyol, 2009).

Open education is not only about making content available to students for free (Cormier, 2013), but learning should be based on behaviourism, cognitivism, socio-constructivism and connectivism, where students are able to think through the processes of inquiry, critical thinking, discussion and problem solving (Gibson, 2001). This is achieved through the use of technology, based on the Maddox (1986) Type II computer applications which consider that technology is used not only for knowledge instruction but also for knowledge construction (Dwyer, 1996).

By using blogs, students have the opportunities to be actively engaged with the resources and content in a creative manner for their own learning, not only through self-directed learning but also through social interactions with other students and the teacher, who is rather an advisor or a guide instead of being “a sage on the stage”, in the online environment (Kop, 2011; Gourlay, 2015). Hence, students can co-create and share learning materials and knowledge which is viewed by Gourlay (2015) as *sui genesis*. As such, open education is viewed as an emancipatory force (Lane, 2016), which enables students to map and remap on the acquired knowledge in an attempt to increase their understanding through networks, based on the cartography and decalomania principles of Deleuze and Guattari (Cormier, 2012). With co-creation of content based on their learning experience in digital texts (White & Le Cornu, 2011), students become part of the content, process and products of learning (DeRosa, 2016; Orr, van der Hijden, Rampelt, Röwert & Suter, 2018).

In Mauritius, higher education is mostly in the conventional environment. There are five public universities, including on open university. Whether it is open education with mixed-mode learning, or resource-based learning or blended learning or it is the traditional on-campus education, Weller (2002) considered it fundamental to examine the degree to which the higher education is didactic/constructivist and makes use of high/low levels of technology. Is technology being considered as only an investment in education or an innovation that lead to prototype, deployment and evaluation (Scanlon *et al.*, 2013)? Or is it viewed from an educational perspective to support learning (Mercer *et al.*, 2011)? Is it considered as the primary driver of an educational activity or supportive of educational practice (Leaning, 2010)? Is there a shift from technology to pedagogy and practice in higher education institutions in the country? An investigation into the ability or frequency of using blogs as an innovative and interactive tool to learn by learners of the university would give us insights into these lenses.

### LITERATURE REVIEW

Pedagogic blogs are used by the students as an explicit part of the teaching and learning process. They may use them as a journal, or an e-portfolio, showing their thoughts, reflections and discussions on the subject (Weller, Pegler & Mason 2005). An appropriate use would supplement face-to-face tutorials (Baim, 2004). The teacher may request each student to keep a blog, post at least a number of words per week and to respond to the posts of at least a number of other students. This would be used as an e-portfolio tool for gathering evidence of learning. So, blogs become a collaborative tool, which students can use as the medium for sharing learning resources and discussions. In a class blog, the teacher may even deliver news, resources, initiate discussions among students. Besides, blogs may be used for improving writing skills, encouraging reflective writing, peer assessment of student weblogs, recording progress and process of learning, and group work (Lowe, 2006). Also, students improve their digital literacy through blogging; and the embedding of blogging in the curricula has the possibility of shifting learning from the time and space-bound classroom situation to a pervasive and entrenched activity (Ellison & Wu, 2008). This gives students more responsibility for their learning and the publishing process (Wagner, 2003).

As interactive web-based learning environments, blogs are used as an interactive discussion among students who interact with learning contents, artefacts. According to Kanbar and Hameed (2018), blogs are effective in the social constructivist learning and blended learning environment in which there are opportunities for adaptive learning, authentic learning, relational thinking, active and learning centred education, the development of higher learning skills or deep learning, and promotes a high degree of interaction and interactivity among the students (Petersen, Divitini & Chabert, 2008; Wang, Li, Li, & Wang, 2014).

Students' use of blogs in higher education depends on how they perceive it. Their use depends on their digital perceptions. The propensity to use blogs is influenced by their age. Are they of the Net Generation, iGeneration. Generation Next, or are they digital migrants? (Barak, 2018; Hill & Nance, 2016; Lai & Hong, 2015). In the context of open education, the profile of students may vary within these different generations. Besides, the rhythm of blogging influences the degree of their interaction in the blog (Garcia, Moizer, Wilkins & Haddoud, 2019).

According to Deng and Yuen (2011), blogs are platforms that give the opportunities to learners to express their feelings, opinions and thoughts in an e-learning environment. Lang (2005) contended that when blogging, there are no specific required technological skills that allow the user to develop, update and publicise their posts. Blogs allow individual ownership; posting of ownership in reverse chronological order as well as archiving and have some similar features as a web page such as easy creation of the page, the content of presentations can be easily categorised and the author can invite other blog users to interact (Sim & Hew, 2010). Blogs are used as an educational tool due to its technological and functional features that promote reflective thinking, collaboration, interactivity among others (Kilic & Gokdas, 2014).

Hsu and Lin (2008) affirmed that blogs are widely used as Web 2.0 tools in universities and are a major tool for knowledge sharing. Furthermore, Hall and Davison (2007) acknowledged blogs as not merely a tool for providing online information but instead as a tool for learning in education. This use of blogs enhances the perception of the students on ICT usage and developing ICT skills in them (Goktas and Demirel, 2012). Blogging allows the development of social, cognitive and self-directed learning skills for both teachers and learners; this encourages peer learning but learners cannot mentor each other with skills which are of higher-order (Robertson, 2011). According to Jiang and Ting (1999), when learners and teachers interact in an e-learning environment, the learner is perceived to be learning effectively. Halic *et al.* (2010) and So and Bush (2008) reported, accordingly that when this takes place, the level of collaborative learning is perceived to be higher. However, Kang and Imt (2013) found that social intimacy and learner's perceived learning are negatively correlated.

Blogs promote reflective thinking as the learners posts their views and thoughts in a chronological manner and this allows the bloggers to perceive the way their thoughts and views have evolved (Ellison & Wu, 2008; De Mattos, 2014). Kim *et al.* (2011) advocated social constructivism as well as Web 2.0 technology are considered through activities and experiences that are related to blogging. Since blogging is interactive, it gives learners the opportunity to exchange their learning experience by publishing their thoughts, viewing and comments, sharing links and exchanging feedback (Kim, 2008). Besides, Halic *et al.* (2010) pointed out that “*blogging provides a means for students to connect in smaller groups to overcome the anonymity of a large lecture hall, working together to create a community of learning.*” (p. 208). Even teachers are engaged through social networking and meaningful discussion through blogging.

Despite the potentials of blogging appraised by many teachers as a means of increasing student interactivity and collaboration, yet there are few studies conducted on the effectiveness of blog use. Some researchers reported blogging as a useful tool to promote the online engagement of learners in activities (So & Brush, 2008; Kreijns, Kirschner, & Jochems, 2002). In contrast, Kim (2008) conferred blogging as a useful tool does not have a positive impact on learners' involvement in such activities. Hew and Cheung (2013) reviewed six recent studies and concluded that the use of blogging has some limitations in coming up with reliable evidence concerning the prior ability of the learners and whether they are in accordance with their abilities demonstrated after regular blogging (El Tantawi, 2008; Arslan & Sahin-Kizil, 2010). It was also impossible to assert that the skills acquired by learners who blog are directly related to blogging alone (Wong & Hew, 2010; Salam & Hew, 2010).

The emergence of social media has shifted blog users to other media of sharing technologies such as Facebook and Twitter and stolen the limelight from blogs which they once represented (Bernoff & Li, 2010). Lenhart, Purcell, Smith and Zickuhr (2010) further contemplated that the younger generations are more interested to use social networks and show less interest to blog. Some researchers claim that the premise of blogs as a facilitator to information sharing within and across the communities of prosumers was ineffective (Kottke, 2013). Social platforms such as Facebook, Instagram and Twitter have changed the prominence of blog communities and made shared-interest groups less blog-centered (Kozinets *et al.*, 2010).

### OBJECTIVES OF THE STUDY

The aim of the research was to analyse the extent to which students in higher education actively use the blog as an interactive technology learning tool. The objectives were:

- (a) To determine the extent to which students use blog for online interactions
- (b) To analyse the factors that influence them to use or not to use a blog in their learning.

### RESEARCH METHODOLOGY

The processes and approaches adopted in the study are discussed in this section. The selection of respondents and the research instruments used for the collection and analysis of data are described. A mixed-method approach was adopted. Survey questionnaires were administered to 600 learners from the Open University of Mauritius (OU) the University of Mauritius (UoM), and the Centre for Open and Distance Learning (CODL) of the Mauritius Institute of Education. The OU is a blended university; the UoM is a conventional university; and the CODL is a fully online higher education. 433 students responded to the survey (72.2 %). The research sample was 433 participants, 71.4 % were females and 28.6 % were males.

The SPSS software was used to analyse the data from the survey. In addition, three focus group interviews were conducted with the learners of each institution in an attempt to understand the meaning of the quantitative findings from the survey. Therefore, an explanatory sequential research design was used. Participants were selected through purposive sampling technique. Purposive sampling is ‘a non-probability technique used to establish a sample space for a particular study’ (Uprichard, 2011). The selection of respondents was based on their uniqueness in terms of their qualities, namely their use of blended learning, their level of maturity as adult learners and the



fact that they were key informants on the use of social media and Moodle for their learning experiences and opinions about them. The participants for the three focus group discussions were 24 students and those for individual interviews were 8 lecturers from the three HEIs

The demographic characteristics of the lecturers are given in Table 1 below.

Participants	Gender	Age	Highest Qualification	Years of teaching experience in the centre	HEIs
A (Senior Lecturer)	Female	45	PhD	15 years	UoM
B (Senior Lecturer)	Female	42	Master	10 years	UoM
C (Lecturer)	Male	45	Master	5 years	MIE
D (Lecturer)	Male	40	Master	3 years	MIE
E (Senior Lecturer/HoD)	Male	64	PhD	13 years	MIE
F (Lecturer)	Male	50	PhD	5 years	OU
G (Lecturer)	Male	35	PhD	3 years	OU
H (Lecturer)	Male	32	Master	3 years	OU

Table 1: Demographic characteristics of the sample (Lecturers)

The respondents of the survey were mostly aged between 18-25 years, followed by those who were aged between 26-35, those between 35-50 years and those who were above 50 years old respectively as shown in the figure below:

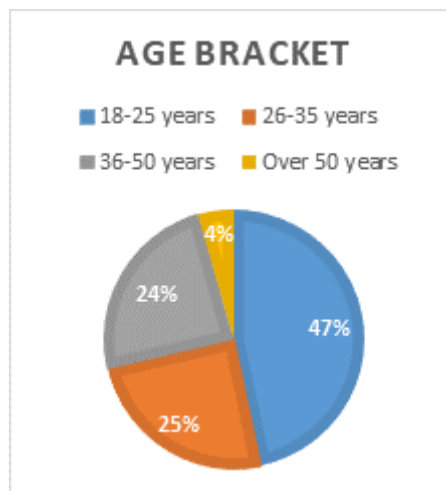


Figure 1: The age distribution of the sample of participants (Learners)

For the purpose of the qualitative data analysis, the information gathered was coded. Content analysis of the transcribed interviews was done to determine the emerging themes. The implications and meanings gathered from the study were explored and synthesised for presentation.

After the analysis of the data from the survey, the ‘why’ of the findings was explored through focus group discussions with the learners; why do they use blogs to the extent obtained from the survey?

The qualitative data was analysed by following the five-step procedures proposed by Thomas (2007):

- (a) preparation of raw data files
- (b) close reading of the transcribed text
- (c) creation of categories
- (d) overlapping coding and uncoded text
- (e) continuing revision and refinement of the category system.

Member checking was used after the final report on the data. Ethics were considered in accordance with the Mauritius Data Protection Act (2017). It ensured that the rights of the participants, including anonymity and confidentiality, are protected.

### RESEARCH FINDINGS AND DISCUSSION

Blogging allows the students to express their thoughts, feelings and emotions in the e-learning environment. It is a source of interactivity between and among student, peers and tutors. Therefore, to meet the objective of this research, the researchers had carried out a survey to assess the number of students who were actively using the blog as an interactive online platform for their online engagement. It was found that despite its worldwide popularity, blogging is not common among the students of the three blended HEIs in Mauritius. This situation is shown in the figure below.

The survey revealed that 40 % of respondents did not use online technologies for study purposes. However, 7.4 % of the respondents very often made use of blog; 21.9% reported that they often maintained an online journal while 23.6 % claimed that they rarely use it, and 7.2 % very rarely utilised such an online tool. Figure 2 below shows these percentages.

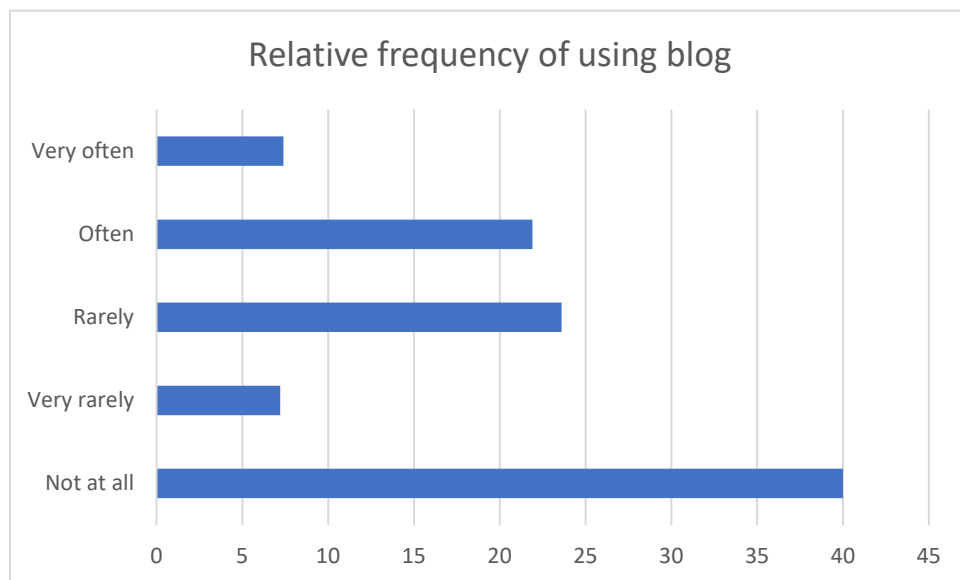


Figure 2. Relative Frequency of using blog among students in percentages (%)

It was obvious that most of the students were not using the blog as an interactive medium in their studies. Although researchers have reported that blogging enhances the ICT usage of students yet, the least usage of blogs might have a negative onset on learner technology interaction of the students. Both students and tutors were interviewed to explore the ‘why’ of such an observed trend. The following themes were obtained from the interviews: cultural inhibition, too structured curriculum, the preference for social networking, lecturers’ unwillingness to adopt it as a useful tool for instruction, and information overload.

#### **Cultural inhibition**

From the findings, it is obvious that there has been a cultural shift in the use of technological tools among youth. Blogging was used in the past before the advent of social media tools such as WhatsApp and Facebook. Even though blogs are widely used as Web 2.0 tools in universities and are a major tool for knowledge sharing (Hsu & Lin, 2008), yet it was found that such was not the case in Mauritius. This is justified by Student 2 in FGD X:

*“We don’t really use blogs but instead we use WhatsApp so that our friends may answer, and help us out with our learning difficulties.”*

In the same vein, Student 4 of FGD Z added:

*“Students have to know that the blog exists first, then go to the site, read about your posts and then if they want to respond. But, on WhatsApp, it is different.”*

The lecturers also were of the same opinions. They averred that blogging is a less popular trend of learning among their students. To illustrate this situation, Lecturer C regrettably observed:

*“Very slowly, we have noticed that even blogging has started to become less popular. It is not the thing that youngsters or students really like to do. They will rather use Facebook or twitter where they will get comments and timely feedback”*

This was in line with the findings of Lenhart, Purcell, Smith, & Zickuhr (2010) that students have less interest to blog while they are more interested to use social media networks. So, blogging is not part of the culture of learning among university students because of an obvious cultural inhibition to share personal experience and information publicly, in contrast to social media network where they may share privately. Lecturer G commented that:

*“The problem is that Mauritian students are too introvert; they do not want to share their information with others. They are probably afraid of the comments of others on their posts about their views and thoughts.*

This finding is supported by Dahlstrom *et al.* (2013) who acknowledged that students are cautious on their privacy when technology causes greater integration of both their academic and personal lives. However, Hurlburt (2008) advocated this feeling of insecurity is temporary and disappear once the students are comfortable with their peers and tutors. It would have also been the role of the tutors to encourage students to blog by providing them feedback on their progress and learning as well as engaged them in conversation that would challenge and heighten their cognitive thinking (Chen, 2002).

#### **Too structured curriculum**

Most of the respondents claimed that the decrease in the frequency of students using blogs was attributed to the lack of willingness of the institutions to promote it. Blogging is not part of the teaching strategy of the lecturers in the higher education institutions of Mauritius. It is neither part of the assessment strategies in online teaching. From this perspective, Lecturer H commented:

*“Unless the tutor asks the learner to create a blog to do an activity that forms part of the teaching and learning process and why not assess through such activity whether the learner has achieved the learning outcomes, learners will never use blogging in their studies.”*

The students of the FGD 2 all concurred that the lecturer as well as the university have the crucial role to encourage them to use blogging as an embedded instructional tool in the curriculum. They shared the view of Lecturer H that:

*“The university should encourage lecturers to discuss its proper educational use.”*

In the blended learning approach, blogging is considered as the intermediate level whereby the student use blog to interact online with their peers and tutors through online activities (Prohorets & Plekhanova, 2015). Robertson (2011) further contended that blogging facilitate the development of social, self-directed learning and cognitive skills for learners and teachers; the commenting features encourage peer learning although it did not coach each other with higher-order skills. However, Goh *et al.* (2010) found that it would also be challenging for the tutors to use blogs as a tool for pedagogical purpose in getting the learners for expression of their opinions and views.

Blogging is not embedded in the curriculum because “*open pedagogy*” is still a new concept in the context of tertiary education in Mauritius. The curriculum is prescribed and imposed in books and hand-outs by the lecturers. The lecturer is considered as “*the sage on the stage*”. This technique to teaching does not promote the socio-constructivist approach to learning nor metacognition. The students rarely have the choice and voice in the curriculum. Student-generated content or knowledge through collective intelligence occurred in a community of inquiry that is created through blogging is not considered as credible. This is confirmed by Lecturer C, who stated:

*“At the end of the day, a blog is something written by someone; there is the problem of credibility of the creation of knowledge.”*

Wang (2008) consistently found that students would not be interested to venture in creating knowledge and content whereby the credibility is not assured. He further contended that the intellectual property remains a concern in higher education as blogs may consist of content that was previously used without correct attribution.

### ***The preference for social networking sites***

The findings revealed that students in higher education institutions have the need to be socially connected, and not to passively wait for their classmates to respond to blogs. It was found that there was a shift in the use of technology whereby students are using social media as a means of 'blogging'. Since they are millennials and are tech-savvy, they are more interested in almost timely response to their search for information to learn. So, they are more likely to use WhatsApp and Facebook as technological learning tools to interact with their peers and lecturers. As per the Statistics Mauritius Report, there were 720,000 Facebook users for a population of 1.4 million people in Mauritius (Statistics Mauritius, 2016). Students and lecturers in this study concurred that students learn as a community on social networking sites, that are accessible even on their mobile phone. Student 4 of the FGD 1 averred:

*"We post our work or assignments to friends on WhatsApp or email and then we comment."*

Lecturer B added:

*"Instead of such online commitment, students are mostly moving towards social networking where using Facebook, you can write where both platforms are here to express on the log or on the Facebook networking. On WhatsApp and Facebook, the whole community of friends and classmates are here to freely share their views and opinions about everything, including their learning difficulties and what they learn in classes"*

This is inconsistency with the findings of Bernoff and Li (2010) who maintained that the emergence of social media shifted blog users to other media of sharing technologies. Lenhart, Purcell, Smith, & Zickuhr (2010) further maintained that the younger generations are more interested to use social networks and show less interest to blog. Kozinets *et al.* (2010) affirmed students could obtain timely information from their peers through social media platforms as compared to blogs where they have to invite people to visit their webpage and there is the uncertainty of getting a feedback from the community of bloggers.

### ***The lecturers' unwillingness to adopt blogging as a teaching tool***

All the lecturers unanimously averred that they never used blogging as a teaching tool. Yet, they did recognise that it can be used alongside any other teaching strategies. For instance, a lecturer may start a debate in his blog and allow his/her students to blog. Various reasons were given by them to justify their reluctance to adopt blogging: lack of confidence to use it; using other online platforms like Zoom, Moodle, Google classroom is more interactive and user-friendly; and the reluctance of students to publish their work and views in blogs. For instance, Lecturer D commented:

*"I have never used blogging due to my fear of the unknown as I like my comfort zone with Zoom. I do not trust it nor am I confident to use it as I lack training and support from the university to use it."*

In the same vein, Lecturer F added:

*"A blog cannot be trusted as viable and valid per se. The source is difficult to verify, especially today with so much intox... It is a community share., not an open-source as such..."*

The participants also found that blog lacks interactivity and other teaching features, compared to Zoom, Moodle, Google classroom, and chat forums. To illustrate this argument, Lecturer B pointed out:

*"Blogs can be used only to post learning materials, but platforms are more adapted for teaching, assignments and grading which are integrated in the systems."*

### ***Information overload***

Most of the students interviewed affirmed that they could not rely on the huge amount of information that is available in blogs. They suffered from information glut (Kazi, 2014), cognitive overload and hence infostress (Bawden & Robinson, 2020). In other words, they found it difficult to obtain usable information and knowledge from reliable sources; so they are stressed in trying to get the required information. Blogs are technological tools used to create and record one's thoughts and ideas, and to construct knowledge. Yet, the students perceived that they were so much overloaded with information on concepts that they study that they could not decide which information to choose and use in their studies. This is the problem of infobesity that results from information overload in blogs. Student 3 of FGD 1 stated with many grievances that:

*"When I browse a concept on Google, I come across many blogging sites with many blogs. I am so much overwhelmed with so many discussion blogs that I found it a headache to read through all of them to look for the most appropriate and relevant information to my studies."*

This statement is consistent with the views of lecturers who indeed reject the use of information from blogs. For them, they are not reliable. Lecturer B concurred with Lecturer F and Student 3 of FGD 1:

*“It is difficult to check the authenticity of the sources of the information in blogs”.*

Students are not prepared to commit themselves to sift, review and synthesise particular information when they have access to too much information (Kazi, 2014; Roetzel, 2019). It is obvious that information overload which is the result of blogging is a threat to academic literacies and production for students in universities. Information overload has become a menace in the academic sector, as information may be manipulated and faked in blogs (Renjith, 2017). This explains the reluctance of students to read blogs of others and to have their own blog (Rieck, 2008).

## CONCLUSIONS

Blogging has proved to be an important technological tool for teaching and learning in higher education institutions. However, in the context of Mauritius, students, as well as lecturers, have an aversion to adopting it to enhance e-learning. The introvert culture of the Mauritian students of higher education who are reluctant to sharing their feelings, opinions and views on an open platform prevents them to experience the benefits of the socio-constructivist approach to e-learning. Moreover, they prefer the friendly social and learning environment of social network sites to which they are more familiar, namely Facebook and WhatsApp, which are more easily accessible on their mobile phones. They are also so much cognitively overloaded with information in blogs that they have developed an academic phobia for blogging. The lecturers, on their part, are still adopting the traditional structured approach to curriculum, whereby they do not value student-generated content or knowledge. The shift from the cognitivist approach to the socio-constructivist approach or democratic approach to learning in the context of open education or e-learning, based on the principles of andragogy has not been adopted yet in Mauritius. Students and lecturers are unwilling to adopt blogging as a teaching and learning technological tool. It is highly recommended that higher education institutions adopt the scholarship and evidence-based effective e-learning practices on personalised learning, as well as collective intelligence, and the community of inquiry that are fundamental pillars of open education and e-learning in the 21<sup>st</sup> Century, whereby emphasis is made on the acquisition and application of the 21<sup>st</sup> Century skills for effective learning, especially in this era of technology and digitalised education.

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## USE OF SIMULATION TECHNOLOGY FOR TEACHING OF FACIAL ANALYSIS IN SPEECH-LANGUAGE THERAPY

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### ABSTRACT

The objective was to develop and evaluate technological resources for teaching in facial analysis. **Methods:** The study included 20 Speech-Language Therapy students, who studied (1<sup>st</sup> stage) and trained the facial anthropometric measurements (2<sup>nd</sup> stage) by the Invivo5® software (experimental group – EG), individuals of the *In Situ* group (control group – CG) and Speech-Language Therapy group (PG), who collected measurements from the same individual (3<sup>rd</sup> stage). **Results:** The Interactive Tutorial was composed by: “use of caliper”, “evaluating the patient” and “use of software” (1<sup>st</sup> stage). The CG used the *In Situ* training to solve doubts, reporting the possibility to improve the practice (2<sup>nd</sup> stage). There was no statistical difference between values obtained by EG and CG, there was difference in measurement of the lower lip and time between PG and students (3<sup>rd</sup> stage). **Conclusion:** There is effectiveness of simulation since there were no differences between traditional and simulated teaching methods.

**Keywords:** Speech, Language and Hearing Sciences. Anthropometry. Interactive Tutorial. Computer Simulation. Teaching Materials.

### INTRODUCTION

Anthropometry is the science that aims to measure the size, weight and proportions of the human body (Heymsfield & Stevens, 2017). Specifically, for determination of facial type, cephalometry is one of the most used means and involves measurement of craniofacial structures on lateral cephalograms. However, it is not always included in the speech-language therapy routine, besides the need for radiation and possibility of image distortion (Cutovic et al., 2014). Thus, it is fundamental to achieve resources to make this type of analysis

reliably and easily inserted in the daily routine of these professionals, such as measurement by caliper or tape, obtaining the measurements and locating the points directly on the individual's face.

The reliability of measurements depends on the accurate location of anthropometric points, maintenance of head in adequate position and patient's compliance. The practice of clinician and/or researcher is fundamental factor in the quality, accuracy and interpretation of these measurements (Cattoni et al., 2009; Heymsfield & Stevens, 2017).

For this reason, knowledge on anthropometry has been increasingly used in the clinical routine of speech-language therapy, aiding in the assessment, diagnosis, prognosis and therapeutic planning. Facial measurements allow classification of facial type, evaluation of dental occlusion, facial harmony, orofacial musculature, shape and configuration of craniofacial structures, and aids the evaluation of mastication, swallowing, voice, breathing and speech functions (Cattoni et al., 2009).

Besides the clinical use of anthropometry, these sciences may also have a forensic application, for the purpose of facial biometric identification. In recent years, the number of judicial requests for identification of individuals captured by video surveillance has grown, for comparison of facial images with a determined suspected individual. In this sense, the application of knowledge on Orofacial Motricity, regarding the analysis of facial morphology and anthropometry, has become a great aid to solve cases of judicial interest, increasingly inserting the speech-language therapist in this environment (Baldasso et al., 2016).

During the last decades, the use of technological resources has grown considerably for the purpose of education and assistance in the fields of education and health. By receiving information by technologies, the student interprets, is renewed and modified, which are paradigm transformations in the teaching and learning processes (Zilma Silveira Nogueira Reis, Maria do Carmo Barros de Melo, Edison José Corrêa, Alamanda Kfoury Pereira, Dimitri Bassani dos Santos, 2016).

Simulation has been used as an additional learning method, which allows retention of knowledge for a longer time, and is more pleasurable than traditional teaching. Computer simulation is a computer-mediated training aiming to construct models of a real or fictitious system, in a dynamic and simple manner, to enable the exploration of imaginary or real situations, allowing the formulation of hypotheses, tests and analysis of results without the possible risks of a real situation (Lieberth & Martin, 2005).

One example of the use of simulator in speech-language therapy is the audiometry simulator used by undergraduate and graduate students (Lieberth & Martin, 2005), a computer game about head and neck anatomy and physiology (Rondon et al., 2013), and a 2D computer game and 3D computer model on anatomy and physiology of the orofacial myofunctional system (Rondon-Melo & De Andrade, 2016).

In this context, the introduction of simulation as a teaching method in Speech-Language Therapy can aid the acquisition of manual skills. Thus, the development of interactive materials and adaptation of computer programs for training of Speech-Language Therapy students may be an alternative to virtually test the identification and achievement of orofacial anthropometric measurements several times, before contact with a real patient.

The objective was to develop and adapt technological resources for teaching in Orofacial Motricity, specifically concerning facial analysis, and to evaluate the effectiveness of simulation for the learning process.

## **METHODS**

### **ETHICAL ASPECTS**

The study was approved by the Institutional Review Board of the involved institution (CAAE number 55623216600005417).

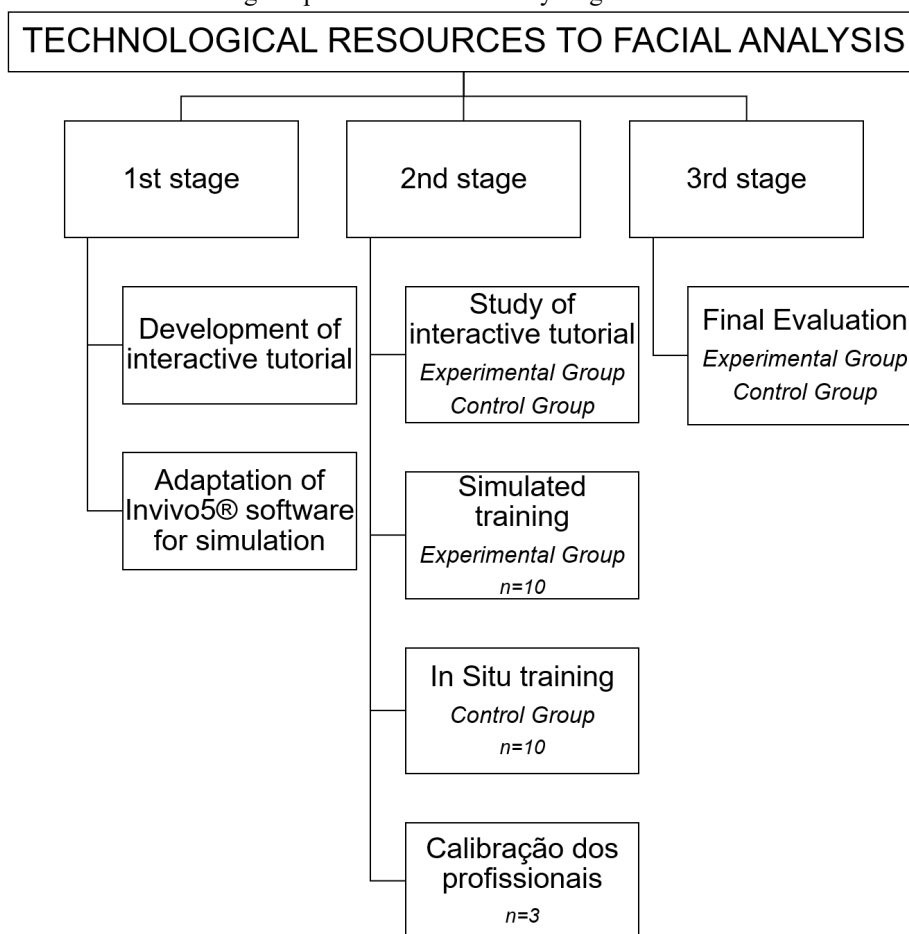
**SAMPLE**

A total of 24 second-year undergraduate Speech-Language Therapy students were invited, who had completed the discipline “Orofacial Motricity II”. The 20 students included were randomly divided into two groups, balanced as to the previous knowledge about the subject, as checked by the final grades of the discipline Orofacial Motricity II ( $p = 0.24$ ).

The study excluded participants who did not attend the meetings and trainings or did not participate in any stage of the study, which did not occur.

Three speech-language therapists working in the field of Orofacial Motricity, with at least three years of experience in facial analysis, were also invited. This group participated in a previous calibration, so that all professionals presented the same evaluation criteria, only after the final stage of the study, called “Final Evaluation”. The sequence and details of the study are demonstrated in Figure 1.

**Figure 1** – Flowchart demonstrating the procedures of the study stages.

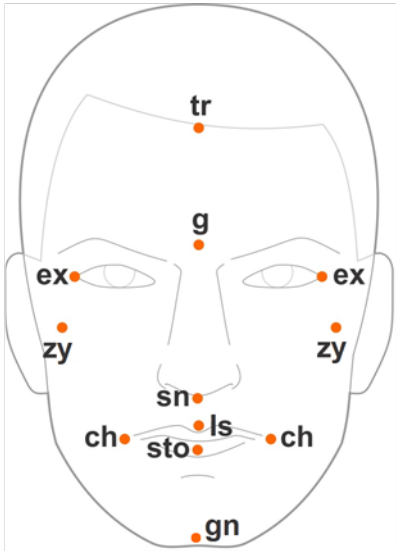


**FIRST STAGE**

**Development of interactive tutorial**

The interactive tutorial was built from the updated literature on Orofacial Motricity about evaluation protocols used in the speech-language therapy clinic, to help the student to dynamically learn the exact location of anthropometric points (Figure 2) (Caple & Stephan, 2016; Cattoni, 2006).

**Figure 2** – Orofacial anthropometric points and measurements found in the literature.

Orofacial anthropometric points <sup>9, 10</sup>	Orofacial anthropometric measurements <sup>9, 10</sup>
<ul style="list-style-type: none"> <li>• Glabella (g)</li> <li>• <i>Trichion</i> (tr)</li> <li>• Gnathion (gn)</li> <li>• External cantus of right eye (ex)</li> <li>• External cantus of left eye (ex)</li> <li>• Subnasale (sn)</li> <li>• Labrale superius (ls)</li> <li>• Stomion (sto)</li> <li>• Right cheilion (ch)</li> <li>• Left cheilion (ch)</li> <li>• Right zygomatic (zy)</li> <li>• Left zygomatic (zy)</li> </ul>	<ul style="list-style-type: none"> <li>• Height of upper lip (sn-sto)</li> <li>• Height of lower lip (sto-gn)</li> <li>• Filtrum height (sn-ls)</li> <li>• Upper facial third (tr-g)</li> <li>• Middle facial third (g-sn)</li> <li>• Lower facial third (sn-gn)</li> <li>• Facial width (zy-zy)</li> <li>• Facial height (g-gn)</li> <li>• Distance between left external eye canthus and left cheilion (ex-ch)</li> <li>• Distance between right external eye canthus and right cheilion (ex-ch)</li> </ul>
	
Source: Designed by the author	

The project included participation of a designer, who was responsible for image layout, selection and processing and content structuring. In addition, the HTML5 language was used by a programmer, allowing presentation of the tutorial in an executable software, permitting the structuring and presentation of content in a technological and integrated manner.

**Adaptation of Invivo5® software for simulation**

The Invivo5® is a software developed by Anatomage (San Jose, California, USA) to assist dental professionals. Its tools enable the rapid reconstruction of a 3D model from tomographic sections, besides identification of cephalometric points and achievement of linear and angular measurements. Despite being directed to the fields of implantology and temporomandibular dysfunction, it has different resources that also allow simulations of orthognathic surgeries and other applications.

Due to these characteristics, this software was selected for use as a simulation tool for training of facial analysis. Five virtual face models were selected, allowing students to contact a different image each training day.

## SECOND STAGE

### **Study of interactive tutorial**

The students could access the interactive tutorial at any time; however, in order to ensure that they studied the content developed, they were asked to perform presential study for two hours, distributed in four presential meetings, lasting 30 minutes each, for two weeks.

After completing the tutorial study, the students were divided into two groups (experimental and control). The experimental group performed the simulated training on the computer software, while the control group performed *in situ* training using a caliper on members of the group.

### **Simulated training – Experimental group**

Students in the experimental group were trained to achieve the anthropometric measurements on the Invivo5® for two weeks. Each student performed the training five times, at different times and faces.

In each training, the student was instructed to achieve the facial measurements and take notes on a data collection form provided by the researcher, and then repeat the procedure and notes for the second time.

Measurement were obtained on the software with the face in frontal position, followed by face rotation, enabling three-dimensional view and correction of measurements. These procedures lasted approximately 20 minutes.

### ***In Situ* training – Control group**

Students in the control group trained the facial measurements on real people, five times, for two weeks. On each training day, the students achieved the measurements on a different face, so that they had contact with different facial types and measurement variations. In each training it was necessary to identify the anthropometric points on the individual to be evaluated, using an eye pencil, and then perform the orofacial anthropometric measurements and record them on the data collection form, twice.

### **Calibration of professionals**

The speech-language therapists were previously trained and calibrated with measurement of the individual's face used in the final evaluation, to present similar results and a higher degree of reliability for comparison with the students. Initially, they had access to the interactive tutorial, to observe the location of points and anthropometric measurements employed in the study.

## THIRD STAGE

### **Final evaluation**

At this stage, all students and speech-language therapists performed the orofacial anthropometric measurement on the same individual, who remained seated with the feet on the floor, head in usual position, occluded lips and eyes closed. No further instruction was given, since the approach should be directed by each study participant.

Each measurement was obtained twice using the Digimess Pro-Fono® digital stainless steel caliper. The participants recorded all values on the data collection form without having access to previous notes.

The time for accomplishment of each stage of final evaluation was measured by participant: marking the points with the pencil, achieving measurements for the first time, measuring for the second time.

## STATISTICAL ANALYSIS

The comparisons between results (facial measurements) and time for accomplishment of groups were performed as follows:

- Experimental Group x Control Group
- Experimental Group x Professionals Group
- Control Group x Professionals Group

The comparison between groups was performed by one-way analysis of variance (ANOVA) and the Tukey test was applied to analyze the significant results. The tests considered a significance level of 5%.

Also, the differences between first and second measurement obtained in each group were analyzed.

## RESULTS

### FIRST STAGE

#### Development of interactive tutorial

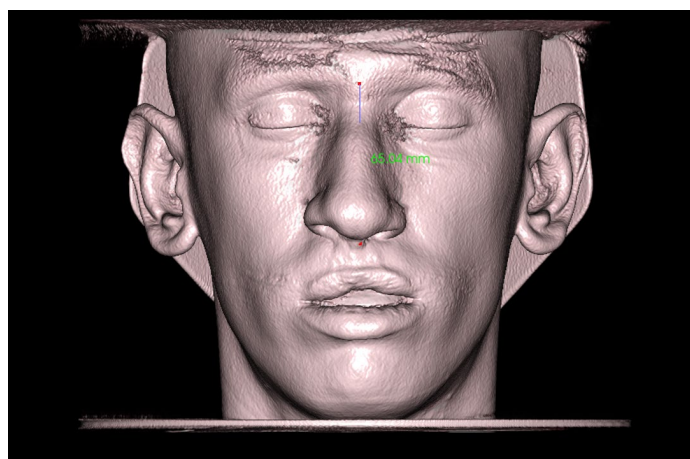
Two images were used to represent the face, one using a computer model representing a virtual face and the other using a photograph of a male individual, representing a real human face. There was a static index with the twelve points and ten anthropometric facial measurements, located on the left corner; a face image that might be selected by the user as virtual or real; and written definition of the selected point or measurement was also provided.

The tutorial also included three subsections, located at a fixed index on the right side of the screen: “using the caliper”, “evaluating the patient” and “using the software”. The section “using the caliper” was designed to present the standardized instrument used for *in situ* facial measurement, presenting the parts of the instrument, instruction for handling and functioning, by a video demonstrating the identification of points and achievement of measurements. The section “evaluating the patient” addresses the positioning and instructions that should be given to the patient during facial evaluation. The last section “using the software” addressed the use of the Invivo5® software for the EG, with step-by-step software use, patient tomography selection, 3D soft tissue image preparation, rotation and identification of points and measurements (there was a total of ten instructions, all properly illustrated).

#### Adaptation of Invivo5® software for simulation

The Invivo5® software has several visualization features, including “Volume Render”, which allows exposure of an individual in three dimensions and exploration of internal structures. This feature has several controls that allow displaying the face in different combinations of color tones, densities, and types of tissue. Each option provides better visualization of certain anatomical structures, soft tissue profiles, airway, and more. The option selected for this study was “Soft Tissue 2”. There is also the option “Distance Measurement”, which allows identifying two points on the face, showing the linear distance between them (Figure 3).

**Figure 3** – Demonstration of identification of orofacial anthropometric measurement “Middle facial third” using the option “Distance Measurement”.



In addition, it allows rotation of the face at different angles to provide a three-dimensional view of the created image, confirming the location of identification of anthropometric points. This rotation can be done manually, using the mouse, or using the toolbar, which guides the face in eight different positions.

## SECOND STAGE

### **Study of interactive tutorial**

The meetings solved doubts arising during the period concerning the location of points or measurements, or even positioning of the examiner in front of the patient. The students made positive comments regarding the use of technology for teaching of facial analysis, mentioning that the tutorial proved to be a simple, clear, objective, didactic, illustrative and easy to understand tool, with useful information, providing greater familiarity with the points and anthropometric measurements, enhancing their identification and providing quick memorization. They also highlighted the relevance of instructions concerning the positioning in front of the patient and handling the caliper.

### **Simulated training – Experimental group**

The simulated training occurred as described in the methods; however, not all tomographies allowed identification of the Trichion point, thus measurement of the upper facial third height (tr-g) was not performed by this group. In addition, during the use of the software, the students could ask questions for the researcher and receive guidance on the handling and marking of measurements.

Most images selected for analysis presented facial imbalances, since they were obtained from patients with indication for surgery. Thus, the study provided students experience with measurements on asymmetrical faces and facial changes, which they reported as positive during training, since they could have a different practice from what they had already learned and because it was more challenging to locate some points.

Students were very keen about the technology and made some comments about using the Invivo5® as a simulated teaching method for facial analysis. They mentioned that training aids the memorization of points and provides greater familiarity with measurements, proving to be a rich resource for learning, since it allows better preparation for the clinic. They considered interesting to test other learning methods and even mentioned that it was easier than on real people. They presented greater difficulty in initial meetings to handle the mouse and understand the face rotation functions, but these were enhanced by training, as well as the accuracy in identifying the points. They also commented on the positive experience of measuring difficult and irregular faces, and that this methodology should be implemented for undergraduate teaching.

### ***In Situ* training – Control group**

The students were trained on five people from their own group, without repetition, following all recommendations described in the method. During training, the students could ask questions for the researcher and receive guidance on how to handle the caliper and mark the measurements. The students made positive comments regarding the *in situ* training, reporting that it allowed greater practice improvement, increased the confidence and safety, being faster, providing greater accuracy in scoring points and greater ability in handling the caliper. In general, they were very satisfied with the meetings and noticed great evolution throughout the training.

### **Calibration of professionals**

The professionals performed the identification of all facial points using the eye pencil. Then, they discussed the positioning of each point until consensus was reached. Each professional performed all orofacial measurements twice and compared the inter-examiner results. Measurements presenting discrepancies were discussed and reassessed by each until they were accepted by all.

### THIRD STAGE

#### Final evaluation

After three to seven days of interactive tutorial study and completion of facial analysis training, all students and speech-language therapists evaluated the same individual. Since the experimental group did not train the “upper facial third” measurement, this was excluded from the final evaluation.

The remaining nine measurements were obtained twice, and the mean values were obtained per group in the first and second measurements, thus providing a mean. It can be observed that nearly all measurements presented differences smaller than 1 mm between the two evaluations, except for one, demonstrating accuracy regarding intraexaminer reproducibility.

Table 1 presents the means and standard deviations of the mean values obtained between the first and second orofacial anthropometric measurements for each aspect, separated by group.

**Table 1** – Presentation of means and standard deviations for each aspect of orofacial anthropometric measurements, in millimeters

Aspect	PG (n=3)	CG (n=10)	EG (n=10)
	Mean ± SD	Mean ± SD	Mean ± SD
Middle facial third	59.75 ± 1.81	61.36 ± 1.90	60.81 ± 3.68
Lower facial third	61.76 ± 0.92	58.58 ± 2.48	59.07 ± 2.35
Upper lip	20.23 ± 0.24	21.02 ± 1.15	20.61 ± 1.60
Lower lip	41.56 ± 0.18	37.09 ± 2.23	38.23 ± 2.37
Filtrum height	11.09 ± 1.17	12.16 ± 0.84	12.31 ± 0.91
Facial height	118.55 ± 1.08	120.06 ± 3.07	118.92 ± 4.60
Facial width	113.32 ± 1.21	117.11 ± 3.96	115.59 ± 6.41
Left eye canthum to left Cheilion	69.76 ± 0.25	69.81 ± 1.33	69.85 ± 1.63
Right eye canthum to right Cheilion	68.98 ± 0.05	69.50 ± 1.61	69.30 ± 1.03

Legend: **PG** = Professionals group; **CG**= Control group; **EG**= Experimental group; **SD** = standard deviation; **L** = left; **R** = right.

The comparison between experimental and control groups revealed no statistically significant difference between any of the values obtained by the students, demonstrating that the training methodology did not interfere with the achievement of results.

When the two groups of students were compared with the group of professionals, it was observed that only the lower facial third and lower lip measurements exhibited statistically significant difference, either in the first or second measurement, or in the mean value, as shown in Table 2.

**Table 2** – Comparison of values obtained for each group for the lower lip measurement and p value.

Groups comparison	Measurements (mm)		p value
PG x CG	PG (n=3)	CG (n=10)	
1 <sup>st</sup> measurement	41.52	36.86	0.03*
2 <sup>nd</sup> measurement	41.60	37.32	0.01*
Mean	41.56	37.09	0.02*
PG x EG	PG (n=3)	EG (n=10)	
1 <sup>st</sup> measurement	41.52	37.84	0.09
2 <sup>nd</sup> measurement	41.60	38.63	0.09
Mean	41.56	38.23	0.08



<b>CG x EG</b>	<b>CG (n=10)</b>	<b>EG (n=10)</b>	
1 <sup>st</sup> measurement	36.86	37.84	0.66
2 <sup>nd</sup> measurement	37.32	38.63	0.35
Mean	37.09	38.23	0.49

Legend: (\*) – Significant values ( $p < 0.05$ ); **PG** = Professionals group; **CG** = Control group; **EG** = Experimental group; **mm** = millimeters; Tukey test.

Each procedure performed during the final evaluation was timed. Thus, Table 3 presents the means and standard deviations of the time, in minutes, that each group took to complete the marking of facial points, the first and second measurements.

**Table 3** – Presentation of means and standard deviations of the times for achievement of measurements, in minutes

<b>Aspect</b>	<b>PG (n=3)</b>	<b>CG (n=10)</b>	<b>EG (n=10)</b>
	<b>Mean± SD</b>	<b>Mean± SD</b>	<b>Mean± SD</b>
Identification of points	0.83 ± 0.03	1.72 ± 0.46	1.96 ± 1.20
First measurement	2.52 ± 0.34	4.82 ± 1.50	5.24 ± 1.15
Second measurement	2.86 ± 0.09	4.45 ± 0.93	4.43 ± 1.04

**Legend:** **PG** = Professionals group; **CG** = Control group; **EG** = Experimental group; **SD** = standard deviation.

Concerning the time each group took to conclude the procedures, there was no significant difference between the results of control and experimental groups. However, comparison between students and professionals revealed differences for all procedures, evidencing that the professionals' experience allows faster achievement of measurements than the students. The times for each group and p value are presented in Table 4.

**Table 4** – Comparison of times each group took to achieve the first and second measurements, in minutes, and p value.

<b>Groups comparison</b>	<b>Time (minutes)</b>		<b>p value</b>
	<b>PG (n=3)</b>	<b>CG (n=10)</b>	
<b>PG x CG</b>			
1 <sup>st</sup> measurement	2.52	4.82	0.03*
2 <sup>nd</sup> measurement	1.86	4.45	0.04*
<b>PG x EG</b>	<b>PG (n=3)</b>	<b>EG (n=10)</b>	
1 <sup>st</sup> measurement	2.52	5.24	0.01*
2 <sup>nd</sup> measurement	1.86	4.43	0.04*
<b>CG x EG</b>	<b>CG (n=10)</b>	<b>EG (n=10)</b>	
1 <sup>st</sup> measurement	4.82	5.24	0.74
2 <sup>nd</sup> measurement	4.45	4.43	0.99

Legend: (\*) – Significant values ( $p < 0.05$ ); **PG** = Professionals group; **CG** = Control group; **EG** = Experimental group; Statistical test: Turkey.

## DISCUSSION

The aim of this paper, which aimed at the insertion of simulation for teaching in anthropometric facial measurements, was not to replace the professor or traditional teaching methods, but to stimulate this extension, allowing the students to have an additional alternative for learning.

The interactive tutorial was explored in its several features, including animations, images, texts and video, which is suggested by several authors to enhance teaching (Baldasso et al., 2016; Lieberth & Martin, 2005; Zilma Silveira Nogueira Reis, Maria do Carmo Barros de Melo, Edison José Corrêa, Alamanda Kfoury Pereira, Dimitri Bassani dos Santos, 2016). The literature proposes the Microsoft Power Point software to create interactive tutorials (Henkel, 2010). However, to assure interactivity and a more sophisticated esthetics, this study employed

the HTML5 language, which supports the latest multimedia content for video, audio and animation within the browser (Reimers & Stewart, 2015).

In speech-language therapy, objective and quantitative diagnostic methods are extremely relevant, thus the caliper is an important resource for facial evaluation (Cattoni, 2006; Cattoni et al., 2009). Patient positioning is also a determining factor at the time of assessment, since the body posture during measurement may alter the outcomes due to the relationship between the stomatognathic system and the cranio-cervical complex (Villanueva et al., 2004). Therefore, the selection of these subjects within the interactive tutorial is justified. An illustrated step-by-step was also provided to the EG regarding the use of the Invivo5® software for simulated training, providing basic instructions for the next step.

In the surveyed literature, no reports were found regarding the development of an interactive tutorial with subjects related to the teaching of Orofacial Motricity. In Speech-Language Therapy, there are tutorials for teaching in audiology (Yates & Campbell, 2005). Although not yet published, the application “Orofacial Anthropometric Measurements: measurement procedures” (Cattoni, 2006) aims to present the evaluation stages of orofacial anthropometric measurements by explanatory and practical videos. Though not described as a tutorial, the application seems to have very similar functions with the tool developed in this work.

The present study did not directly evaluate the effectiveness of the interactive tutorial; however, the students reported positive points with its utilization. The literature shows effectiveness in the use of interactive tutorials for teaching, allowing the construction of knowledge (Henkel, 2010; Kobak et al., 2011).

Many authors propose that anthropometric points should be previously marked on the skin, to increase the precision and accuracy during evaluation using a marker pen (Ramires et al., 2010), dermatographic pencil (Nascimento et al., 2013) or eye pencil (Sassi et al., 2015). This study used the latter because it is easier to remove from the skin and allows a thinner line, increasing the accuracy of the procedure. It should be mentioned that all students did not know this method.

Due to its number of features, studies have used the Invivo5® for different purposes, focusing on implantology (Alzoubi et al., 2016), volumetric airway assessment (Li et al., 2015), quantification of surgical access to the internal auditory canal and temporal bone measurements (Master et al., 2016). However, no reports were found in the surveyed literature regarding its application to measure orofacial anthropometric measurements or for simulated training. The literature shows that measurements on a three-dimensional face are much more realistic than on two-dimensional photographs, resembling a real evaluation (Ozsoy et al., 2009; Yitschaky et al., 2011). Thus, the paid license software Invivo5® met the criteria to be used as a simulator and was used in this study.

According to Moro et al. (2017)(Moro et al., 2017), the utilization of virtual devices, including augmented reality, allows learning by practical immersion experiences, corroborating the results of the present study, since the authors also demonstrated positive perspectives for the effective use of virtual and augmented reality as a means to supplement the content of lessons in Education in anatomy (Moro et al., 2017).

The literature states that good educational softwares should not only bring theoretical content, but also aim to provide practical experiences and application of theoretical basis for problem solving (Rondon et al., 2013). For this reason, this study aimed to associate theoretical concepts (interactive tutorial) and practice (traditional and simulated method). Studies have shown that simulation-based learning is equivalent to the traditional learning method (Lieberth & Martin, 2005; Rondon et al., 2013), which was also observed in the present study, since there was no statistically significant difference in the results achieved in the final evaluation between the experimental and control groups.

Considering that the actual value of the variable measured in this study is unknown, it was decided to employ a group of professionals experienced with facial analysis, who were carefully calibrated, since the experience is not enough to guarantee accuracy. More experienced professionals tended toward overconfidence interfering with the accuracy of the information from the clinical evaluation (Yang et al., 2012).

There was a difference between CG and PG in the lower lip measurement, which presented statistically significant difference (Tables 1 and 2). No reports of studies were found evaluating this measurement and reliability. The evaluations of inter- and intraexaminer orofacial measurements at two different times were considered homogeneous with Orofacial Motricity specialists, indicating that data achieved by different professionals can be considered reliable (Fernanda Veloso et al., 2008).

Concerning the time required to complete the final assessment (Tables 3 and 4), there was no statistically significant difference in the comparison between CG and EG, which demonstrates that, although students in the EG did not use the caliper and pencil, they did not present difficulties that would require more time handling these instruments. Professionals were faster than students to achieve the measurements, justified by their previous experience. However, analysis of the time of marking with the pencil revealed no significant difference between students and professionals, because the professionals were not used to this practice either. Studies report a period of 10 to 30 minutes for the completion of evaluation (Bossle et al., 2015; Fernanda Veloso et al., 2008). In the present study, in the average, students took 11 minutes to mark and achieve the measurements, while professionals spent an approximate average of minutes.

It should also be considered that the computer software used in this study has a paid license, thus not being accessible to everyone. Also, the Invivo5® tools used for simulated training correspond to a small portion of the amount of resources available in this software, and it is not financially viable to purchase it only for this purpose. Thus, future studies might consider the design of a specific open source software for orofacial anthropometric measurements, on three-dimensional faces, focusing on a simulated learning environment. In this sense, the importance of student training in the utilization of emerging technologies is highlighted, allowing future professionals to be familiar with the use of technologies in the work field (Ainslie & Bragdon, 2018).

Despite the positive findings in the present study, further research is still needed to confirm that learning by the use of simulators is comparable to traditional learning. In addition, in the field of Orofacial Motricity, additional studies are necessary to develop technological resources for teaching in this area, which is still scarcely addressed.

## CONCLUSION

An interactive tutorial was developed, and the Invivo5® software was adapted as a technological tool and as a simulated learning environment using the computer for teaching in Orofacial Motricity, specifically regarding facial analysis training. The similar results of students trained by technology and those trained by traditional methods demonstrate the effectiveness of simulation in the learning process of facial anthropometric measurements.

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**FIGURE LEGENDS**

**Figure 1** – Flowchart demonstrating the procedures of the study stages.

**Figure 2** – Orofacial anthropometric points and measurements found in the literature.

**Figure 3** – Demonstration of identification of orofacial anthropometric measurement “Middle facial third” using the option “Distance Measurement”