Impact of Virtual Classes on Technical Education during COVID-19 Pandemic: A Study

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Abstract*-It is evident that, virtual learning is an exceptional substitute to classroom learning. Online learning is new normal/inevitable to avoid academic interruptions. However absence of synchronous teaching creating gap in learning process, online teaching is the only mechanism to reach students. E-learning offers abundant freedom, comfort and flexibility to teachers and students. The present study examines the impact of virtual classes on learners during COVID-19 pandemic. For which, online survey conducted to obtain data from Nitte Meenakshi Institute of Technology (NMIT), Bengaluru. 330 online questionnaires are administered to different branch students of NMIT. 301 responses received and findings shows that majority of the students are comfortable to attend online classes to avail more advantages like flexible timings, easy access to study materials, and quick answers to their queries from their faculty, etc. This study recommends that, there is a need to train students and faculty in use of online platform tools and up gradation of IT infrastructure to deliver uninterrupted virtual classes.*

Keywords: Virtual Classroom, Technical Education, E-learning, Synchronous learning, COVID-19, WebEx.

Introduction

COVID-19 has been announced as a global pandemic. It impacted all walks of life, comprising health, economy, social spheres, and education. As a result, Schools, colleges, and universities were forced to shut. This closure puts a significant problem on the academic educational institutions to cope with the unexampled shift from the traditional classroom to virtual classroom. The most educational institutions around the world have moved their teaching and learning activities to online mode (Naji, et al., 2020). In the absence of traditional classroom teaching and one-on-one interaction, computer-based learning has emerged as the closest counterpart for off-line instruction. Through innovative and learning management systems,

computer technology is functioning as a solution for the continual learning process through this quarantine period. The efforts of users, like teachers, scholars and institutional executives are on for the best use of the computer technology and effective learning process (Mansor, et al., 2012).

A virtual classroom is an online learning environment, generated by the internet, computers, and advanced video-conferencing device in which either one teacher (for remote learning) or the students (for distance education) are not physically present in the classroom at the same time. The virtual classroom is an instrument for providing live e-learning. It's also known as "Synchronous E-learning." The fundamental distinction between face-to-face and virtual classroom training is that the latter uses the Internet to provide content live with persons who are geographically distant. Terms used to describe the delivery format of virtual learning are- E-learning, Internet learning, distributed learning, networked learning, tele-learning, or web-based learning, etc (AlAteeq, et al., 2020).

Review of Literature

Khan opined that the fundamental aim of the virtual classes is to decrease the learning gap that created due to lockdown (Khan, et al., 2021). Students and academic institutions all around the world have embraced and welcomed the online learning platform. Ease of use, learning mobility, and customizable situation are the reason for its acceptability. Now, in the midst of a pandemic crisis, most academic educational institutions are looking into and embracing E-learning to make it easier for learners to adapt to their new normal. Educators and instructors are also trying to introduce numerous e-teaching tools in order to deliver the most accessibility for their learners. In this connection, author his study to explore the perception of e-learning during the COVID-19 lockdown period.

Sirajudeen et al., (2021) highlighted in their study that, online classes were started too early (59.8%), many of respondents had no prior experience about virtual classes (63.4%). Hence they have stated major hurdles like inadequate network access (32.3%), lack of understanding of online platforms (29.9%), and meagre audio/video quality (26.3%) etc. It also focused on the influence of online education in psychological stress, study discipline, living status, and quarantine history of respondents.

Koh and Wong conducted a study to examine the students' awareness of online learning and the university's engagement through the COVID-19 pandemic (Koh and Wong, 2021). According to the study, the pandemic has had a modest impact on their academic plans, with 84% eager to re-enrol for the term and remaining only 6% preferring to wait out the pandemic. The frequency of time spent on finishing assignments has grown (52%) associated to the earlier term, however students have expressed anxiety around keeping up with class work in an online learning situation (56%).Although the fact that the most of learners associate online learning with being worried (49.6%), distracting with (31.6%), and remaining nervous with (24.3%), the results show that 49% of learners appreciate the university's work in their educational inventiveness, subsequently 31% who are grateful for the management's timely updates and hardship fund, and 20% who are grateful for the university's effort in their academic initiative (Pan and Sullivan, 2005).

Giray the goal of their paper is to learn more about CE/SE UG students' e-learning experiences. This study highlighted that; the respondents used video recordings extensively for e-learning and found them useful but indicated face-to-face lectures to be more useful than digital live lectures (Giray, 2021). They found that usage of external online resources for their

academic is being increased during this period. Many respondents opined that, the materials and methods practiced for assessment should be reformed further to improve virtual learning (Bandaya, et al., 2014).

Borges conducted research to investigate learners' perceptions of online learning in the context of a COVID-19 pandemic (Borges, 2021). Learners from two Portuguese Polytechnic Institutes are the focus of this study (Portalegre and Beja).An anonymous and voluntary online survey questionnaire was given to UG engineering students at the two institutions. This research not only indicated that online learning is advantageous through the COVID-19 epidemic, however it besides shed light on the convenience of internet connection, laptops, and mobile phones (Alawamleh, et al., 2020).

Objectives of the study

The main objectives of the study are:

- To know the type of application tools prefer to use for online classes.
- To examine the time spent for online classes among the students.
- To study the satisfaction level of the students on virtual classes.
- To evaluate the challenges faced by the students in adapting to the online classes.
- To identify the problems encountered by the students while virtual classes.
- To suggest the improved measures based on the findings of the study.

Methodology

This research used a questionnaire-based survey method. A well-structured online questionnaire was designed to collect data from Nitte Meenakshi Institute of Technology (NMIT), Bengaluru. 330 online questionnaires were shared to Under Graduate and Postgraduate students of NMIT, Bengaluru, out of which 301 duly filled in questionnaires, were received. The impact on higher education has been dramatic and transformative and a common trend in education systems around the world has been to respond to the pandemic with “emergency eLearning” protocols, marking the rapid transition from face-to-face classes to online learning systems. E-learning tools have played a crucial role during this pandemic, helping schools and universities facilitate student learning during the closure of universities and schools. The use of suitable and relevant pedagogy for online education may depend on the expertise and exposure to Information and Communications Technology (ICT) for both educators and the learners.

Results and Discussion

Data analysis and interpretation

The collected data were classified, analyzed and tabulated by using MS Excel. Analyzed data presented in tabular form as follows.

Table 1 depicts that, out of 301 respondents, 190(63.1%) of respondents are male and 111

(36.9%) are female. It is evident in this study that, the male respondents have attended more online classes' then female respondents (Table 1 and Figure 1).

Table 1: Gender Wise Distribution of Respondent

Gender	No. of respondents	Percentage (%)
Male	190	63.10%
Female	111	36.90%
Total	301	100.00%

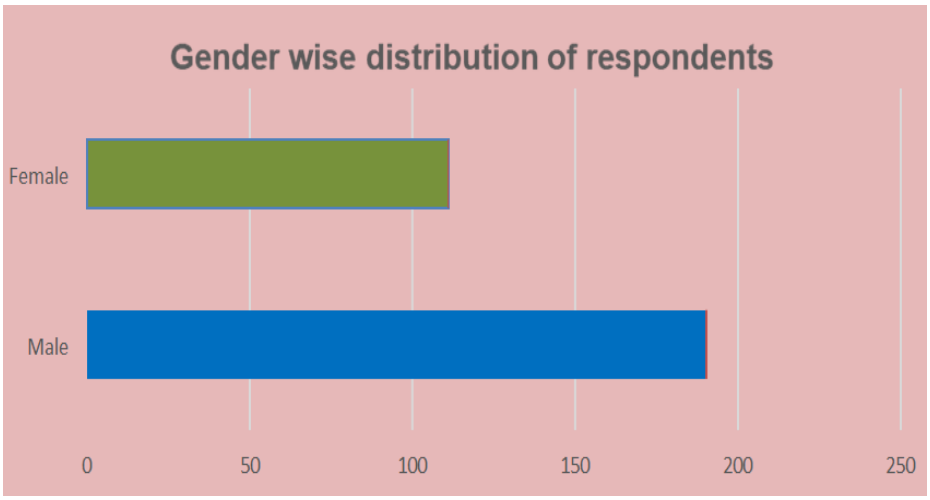

Figure-1: No. of Respondents. ***Note:*** *Male, Female*

Table 2 represents branch wise distribution of respondents, 69(22.9%) respondents are from the Management Studies, followed by 57(19.0%) Computer Science and Engineering, 51(17.0%) Electronics and Communication Engineering, 37(12.3%) Information Science and Engineering, and 13(4.3%) are from Mechanical Engineering (Table 2 and Figure 2).

Table 2: Branch Wise Distribution

Branch	No. of respondents	Percentage
Electronics and Communication Engineering	51	17.00%
Mechanical Engineering	13	4.30%
Computer Science and Engineering	57	19.00%
Civil Engineering	25	8.30%
Management Studies	69	22.90%
Aeronautical Engineering	17	5.60%
Information Science and Engineering	37	12.30%
Electrical and Electronics Engineering	32	10.60%
Total	**301**	**100.00%**

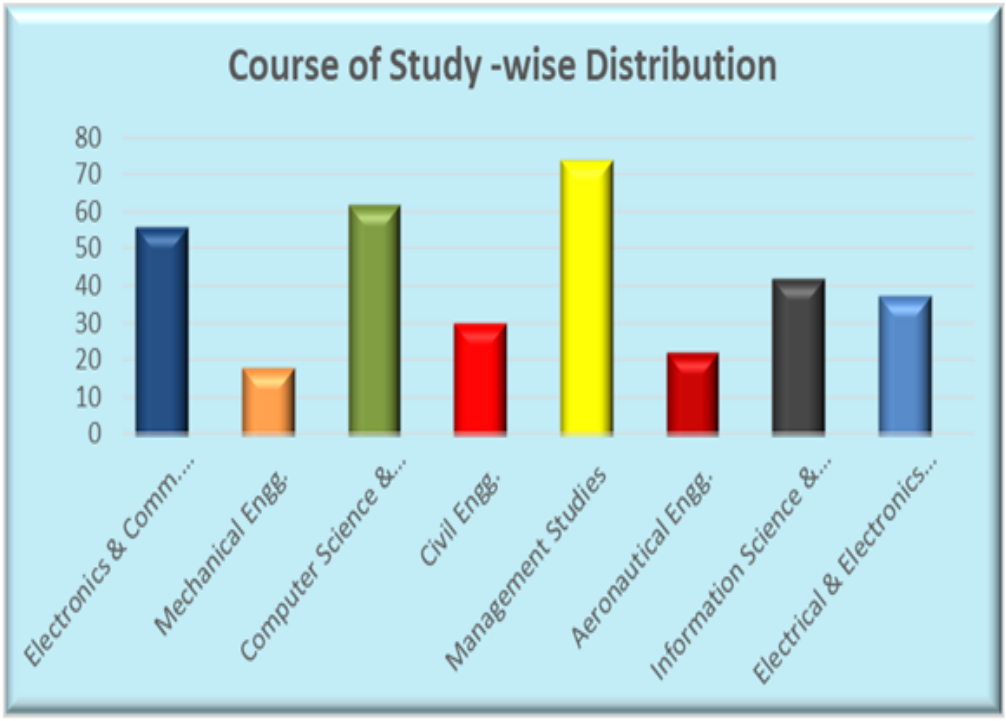

Figure-2: Course of Study-Wise Distribution. ***Note:*** *Electronics and communications, Mechanical engineering, Computer science, Civil engineering, Management Studies, Aeronautical engineering, Information Science and engineering, Electrical and engineering*

Table 3 displays the qualification-wise distribution of the respondents. The table illustrates that, majority 175(58.1%) of respondents are pursuing PG degree, remaining 126 (4.19%) of respondents are pursuing UG degree (Table 3 and Figure 3).

Table 3: Level of Study Wise Distribution

Level of study	**No. of respondents**	**Percentage (%)**
Post Graduate	175	58.10%
Under Graduate	126	41.90%
Total	301	100.00%

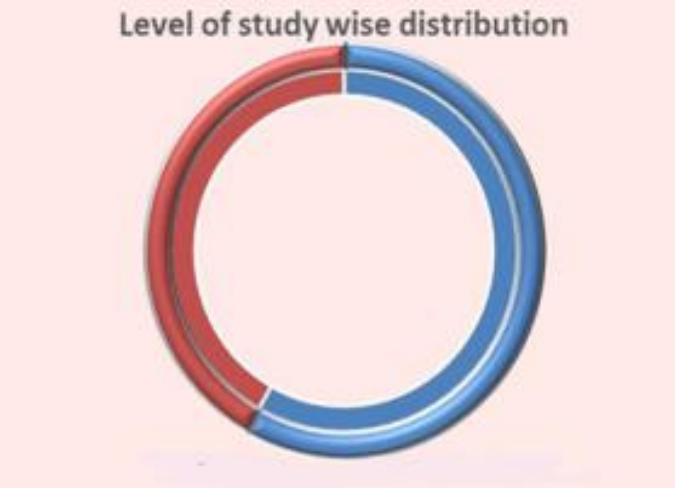

Figure-3: Study wise Distribution. ***Note:*** *Post graduate, Under graduate*

Table 4 shows that, 184(61.1%) of the respondents stated that they had no prior knowledge and remaining 117(38.9%) of the respondents opined that they had prior knowledge about virtual classes (Table 4 and Figure 4).

Table 4: Previous Experience in Virtual Classes

Opinion	**No. of respondents**	**Percentage (%)**
Yes	117	38.90%
No	184	61.10%
Total	301	100.00%

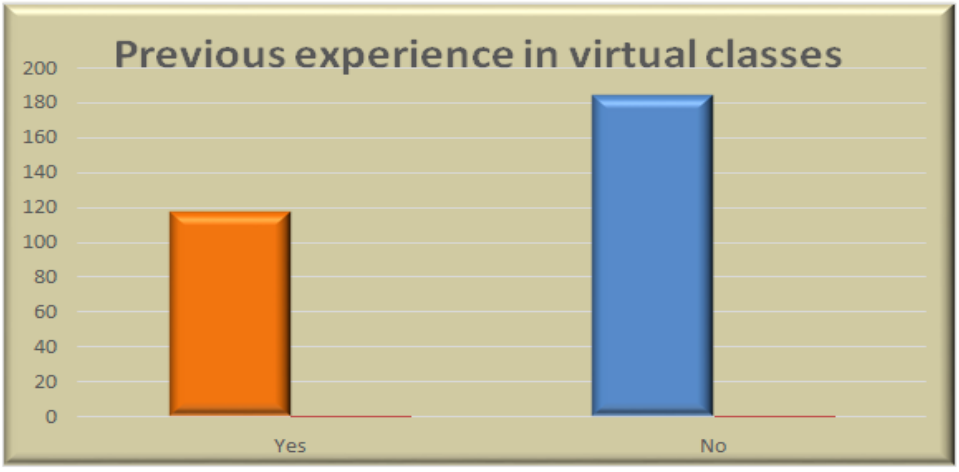

Figure-4: Experience of Virtual Classes. ***Note:*** *Yes, No*

The Data in Table 5 shows that, the highest number of 182 (60.4%) are using Laptops, while 47(15.6%) are using tablet, 43(14.2%) are prefer to use smart phones and 29(9.7%) of them using desktop for the purpose of virtual classes (Table 5 and Figure 5).

Table 5: Preferred Device for Virtual Classes

Device	**No. of respondents**	**Percentage (%)**
Laptop	182	60.40%
Smart phones	43	14.20%
Desktop	29	9.80%
Tablet	47	15.60%
Total	301	100.00%

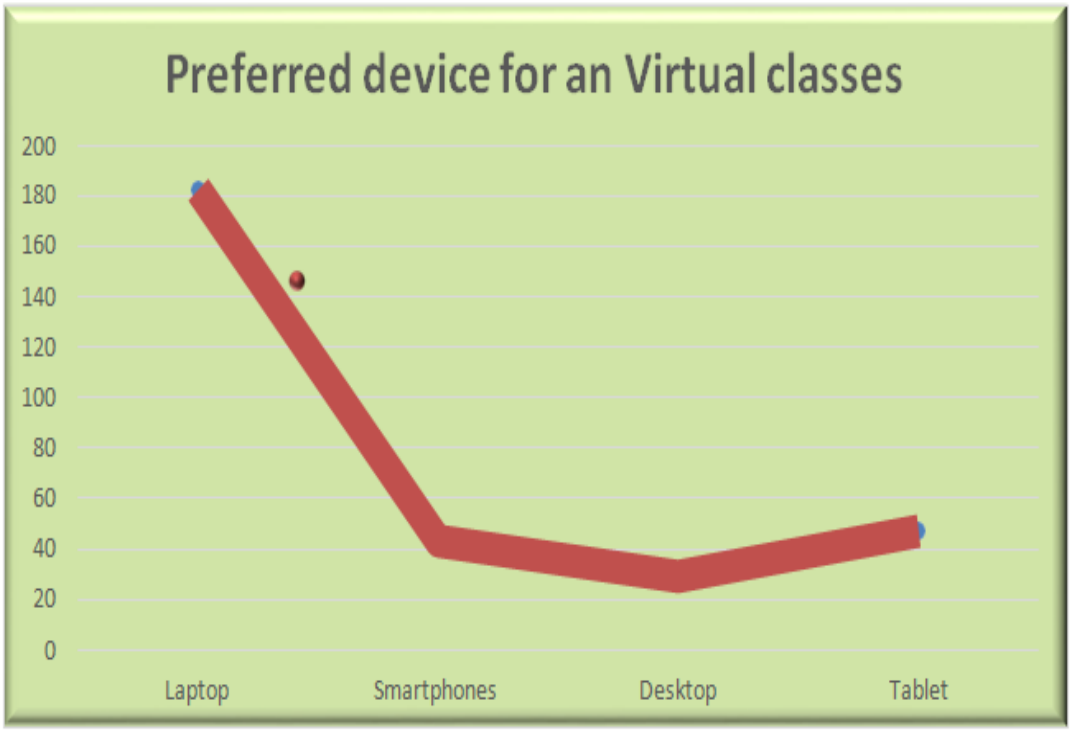

Figure-5: Devices for Virtual Class

Table 6 shows that, 130(43.1%) of the respondents reported that they use Google meet online meeting application for Virtual classes, followed by 134(44.6%) of them use Zoom meeting application and remaining 15(5.0%) of them use Webex meet application (Table 6 and Figure 6).

Table 6: Type of Online Meeting Application for Virtual Classes

Applications	**No. of respondents**	**Percentage (%)**
Google meet	130	43.10%
Microsoft Teams	22	7.30%
Zoom meeting	134	44.60%
Webex meet	15	5.00%
Total	301	100.00%

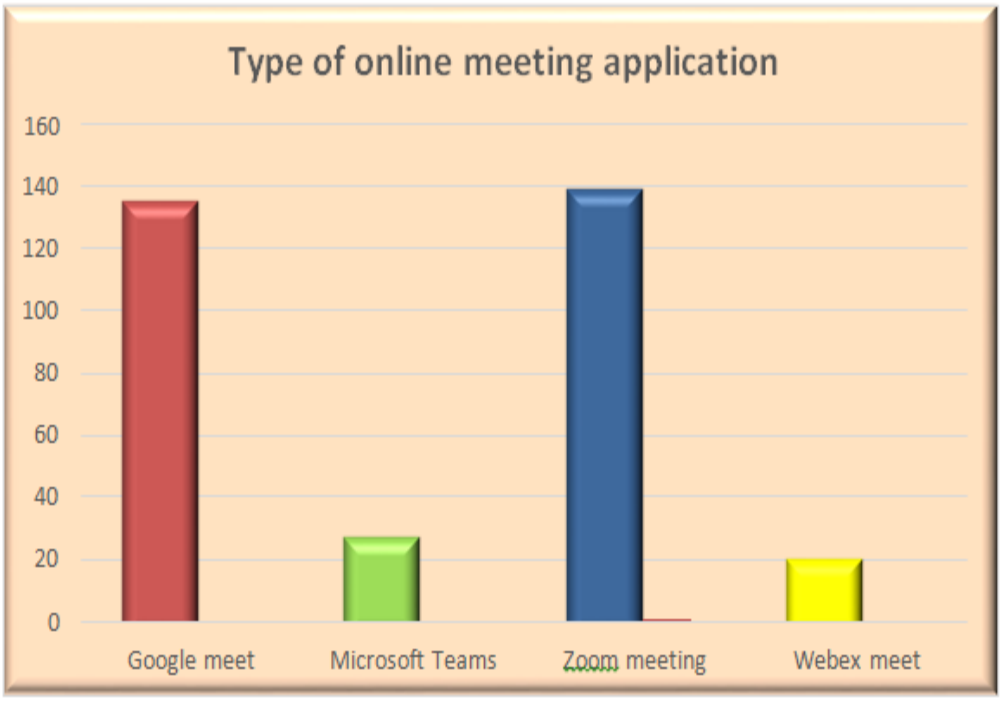

Figure-6: Online Meeting Application. ***Note****: Google meet, Microsoft teams, Zoom meeting, Webex meet*

Data in Table 7 shows that, 150(49.9%) students stated that will have access to the learning resources leisurely 24/7 (Coman, et al., 2020). Furthermore, 73(24.1%) students indicated that Virtual classes inspire students to take part in the learning procedure since the teaching mode moved to attention on student learning (self-paced learning). 51(17.0%) students also said that Virtual classes facilitated them to obtain innovative practices and skills (Table 7).

Table 7: The Advantages of Virtual Classes

Advantages of virtual classes	**No. of respondents**	**Percentage (%)**
Online learning is useful for grasping new skills	51	17.00%
Self - paced learning	73	24.10%
New effective learning tools	27	9.00%
Flexibility in time and communication	150	49.90%
Total	**301**	**100.00%**

Results in Table 8 displays that, 124(41.2%) respondents opined that virtual classroom offers a flexible situation for effective interaction, followed by 86(28.5%) respondents showed that virtual classroom supports self-discovery of learning course content, 39(13.0%) of them stated that they will get quick response to their questions and remaining 18(6.0%) of the respondents opined that virtual classroom offers important materials in visible forms (Shaik, et al., 2021) (Table 8 and Figure 7).

Table 8: Virtual Classroom Teaching on Student Academic Performance in COVID-19

Use of virtual classroom	**No. of respondents**	**Percentage (%)**
It offer flexible environment for Effective interaction	124	41.20%
It supports self-discovery of learning course content	86	28.50%
I have quick response to my questions	39	13.00%
It provides essential materials in visible forms	18	6.00%
It would be easy for me to find necessary information when using a virtual classroom platform.	34	11.30%
Total	**301**	**100.00%**

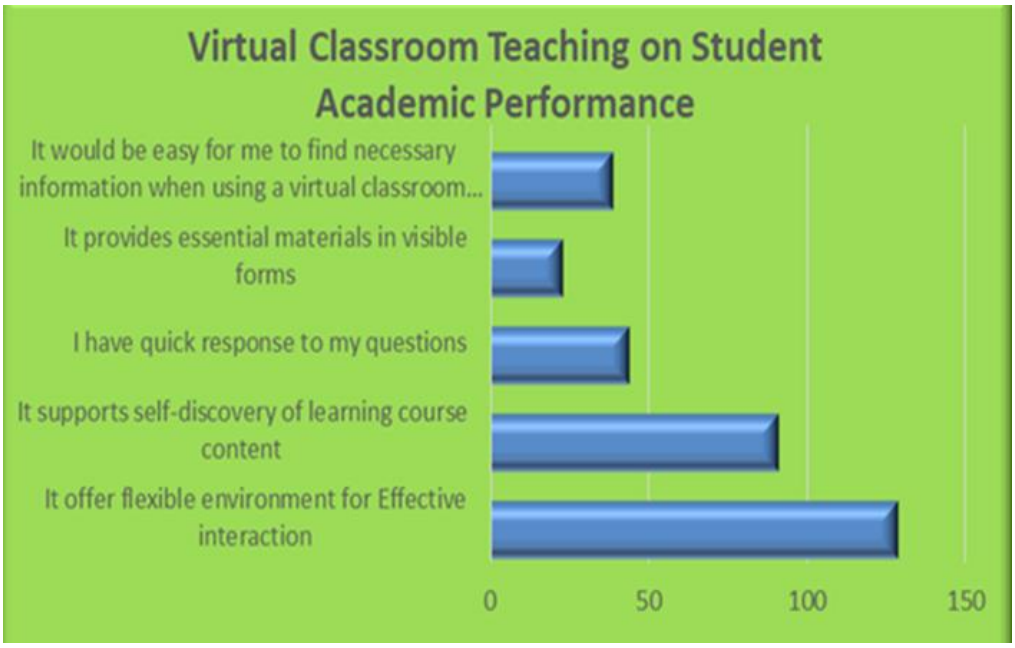

Figure-7: Virtual Classroom Teaching on Student Academic Performance. ***Note:*** *Percentage, No. of Respondents*

Results in the Table 9 shows that, 198(65.8%) of the students are facing the problems of poor network connectivity, because top quality internet service is expensive, and the reasonable Internet services are poor in quality. Hence, it's problematic to join live lectures or download media files (Jason, et al., 2001). Furthermore, in assuring areas, due to geographical restrictions, the telecommunication signal is quite distressed. About 63(21.0%) of the student indicated that Poor audio/video quality and remaining 25(8.3%) of respondents are facing the Problem with using the application (Yilmaz, 2015) (Table 9).

Table 9: Technical Problems Encountered by the Students While Virtual Classes

Technical issues	**No. of respondents**	**Percentage (%)**
Poor audio/video quality	63	21.00%
Poor network connectivity	198	65.80%
Problem with using application	25	8.30%
Disconnection	11	3.70%
Total	301	100.00%

Table 10 shows that, 129(42.8%) of the student are facing Health Issues (eye pain, back pain, headache, etc.), while 78 (26.0%) of them facing the problems of stress, 58(19.2%) of them facing anxiety problems (Table 10).

Table 10: Preferred File Formats to Access and Download E-resources by Faculty Members

General issues	**No. of respondents**	**Percentage (%)**
Lack of face to face interaction	36	12.00%
Stress	78	26.00%
Health Issues (eye pain, back pain, headache etc.)	129	42.80%
Anxiety	58	19.20%
Total	**301**	**100.00%**

Findings of the study

- It was found in the study that, the male respondents (63.1%) are more compared to female (36.9%) respondents.

- Respondents from the Management Studies (22.9%), Computer Science and Engineering (19.0%), Electronics and Communication Engineering (17.0%), Information Science and Engineering (12.3%), and Mechanical Engineering (4.3%) have attended online classes.

- 58.1% of Respondents pursuing PG degree, remaining 4.19% of respondents are pursuing UG degree.

- 61.1% of the respondents opined that they had no prior experience and remaining 38.9% of the respondents conveyed that they had previous experience of virtual classes.

- The highest numbers of respondents (60.4%) are using Laptops, while other respondents (15.6%) used tablet, smart phones (14.2%) and desktop (9.7%) to attend virtual classes.

- Students (49.9%) indicated that online learning made provision to avail learning materials 24/7 leisurely. They said, they are motivated to take part in learning process since virtual classes are student-centered (24.1%), and it assisted them to obtain novel experiences as well as skills (17.0%).

- Most of the respondents stated that they use Google meet (43.1%), Zoom meeting application (44.6%) and WebEx meet application 15(5.0%) platforms to attend online classes.

- Respondents opined that virtual classroom affords flexible environment for effective interaction (41.2%), self-discovery of learning course content (28.5%), quick response

to queries (13.0%), and it also delivers necessary materials in visible forms (6.0%).

- Students have encountered some issues while attending online classes. those are-problems of Poor network connectivity (65.8%), poor audio/video quality (21.0%), some of the respondents are (8.3%) facing problem with the use of application.

- Virtual classes are causing health issues (42.8%), problems of stress (26.0%), and anxiety 58(19.2%).

Conclusion and Recommendations

This study explores that virtual classroom learning motivates instructional approaches like collaborative, independent, autonomous, synchronous and asynchronous instructional strategies that expose learners to obtain knowledge and capabilities.

Findings of this study reveal that, E-learning technology facilitates easy information access leading to progressive attitude formation of learners. Institutions/Universities ought to revive tools and technologies to reach and equip students effectively through virtual classes. Teaching faculty and learners should also be trained to use virtual classroom platforms to obtain learning capabilities.

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