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A Study On Impact Of Virtual Classes On Students' Performance Due To COVID-19

Sonia Gouri[1] , Shweta Singh[2] , Himanshi Chaudhary[3] , Dr. Manish Bhardwaj[4*] , Pranit Puri[5]

[1]Department of Humanities & Social Sciences, KIET Group of Institutions, Delhi-NCR, Ghaziabad, India.

[2,3,4,5]Department of Computer Science and Engineering, KIET Group of Institutions, Delhi-NCR, Ghaziabad, India.

Abstract: Covid-19 has affected the life of everyone in one or another sense. In fact, this pandemic has locked all the commercial and normal activities of people around the world. Education sector is also not untouched from the effects of this disease. It will have been more than one year since last March 2020 when the first lockdown was announced by Prime minister Shri Narendra Modi. As a precaution schools and higher education institutions were also locked and the teaching-learning process had to shift on virtual platforms overnight. In India, where the concept of blended learning has emerged in the last few years, all the teachers were not aware, trained and prepared for virtual classes. They had to struggle a lot with the technical glitches of conducting classes virtually. In present study, an effort has been made to analyze the impact of virtual classrooms on under graduating engineering students during Covid-19. A survey was done online with the help of a questionnaire by using a cluster and simple random sampling method for assessing impact of virtual classes during this pandemic. Then the findings were ascribed to various reasons like availability of proper devices, technical glitches, net connectivity, sharing of space at home with siblings and working parents. Obtained data revealed that even if virtual classes are the only way out during this pandemic, students are facing lots of issues in this situation. The result revealed the impact of virtual classes on students during this pandemic.

Keywords: COVID-19, Virtual Classroom, Students, blended learning.

I. Introduction

Today we find that the whole world is vulnerable to the infection of COVID-19 (Padhan, 2021), (Tripathi, et. al, 2021). While the COVID-19 pandemic is going on, largest interference in education systems are seen in history. Closures of schools and other learning spaces have impacted worldwide. Almost 94% of the world's student population, up to 99% in low and lower-middle income countries are affected (Pokhrel, 2021). It will have been more than one year since last March 2020 when the first lockdown was announced by Prime minister shri Narendra Modi and all were advised to go out only in utmost necessary situations. As a precaution schools and higher education institutions were also locked and the teaching-learning process had to shift on virtual platforms overnight. In India, where the concept of blended learning has emerged in the last few years, all the teachers were not aware, trained and prepared for virtual classes. They had to struggle a lot with the technical glitches of conducting classes virtually. In present study, an effort has been made to analyze the satisfaction of under-graduating students from virtual classrooms during Covid-19. A survey was done online with the help of a questionnaire by using a cluster and simple random sampling method for assessing the level of satisfaction of undergraduate students through virtual classes. Then the findings were ascribed to various reasons like availability of proper devices, technical glitches, net connectivity, sharing of space at home with siblings and working parents. Obtained data revealed that virtual classes have affected the students in various ways as they are facing lots of problems in this situation and a need is felt for enhancing the satisfaction of students through virtual classes.

Further classification for the paper can be best described in the following manner. Section 2, underlines various factors related to the teaching philosophy in virtual classes. Section 3 underlines the research methodology used and a study on various factors related to virtual classes that impacts the student's performance. Section 4 underlines survey findings by drawing attention to constraints that are impacting the student's performance and other health-related aspects. Section 5 underlines the conclusion and future scope that will help both the student and teacher to improve the teaching and learning scenario in virtual mode.

II. Teaching philosophy and Virtual Classes

A classroom conducted virtually creates a learning environment where students involved with the content online. Information is shared with several participants simultaneously and teachers also connect to the same interface. Virtual Classroom requires a lot of time for preparation of content, assignment and quizzes etc. A teacher needs to familiarize with the various tools and platforms available for conducting a virtual classroom. Moreover, an environment has to be created by teachers for building a strong online community for discussion and collaborative learning (Dong, 2021).

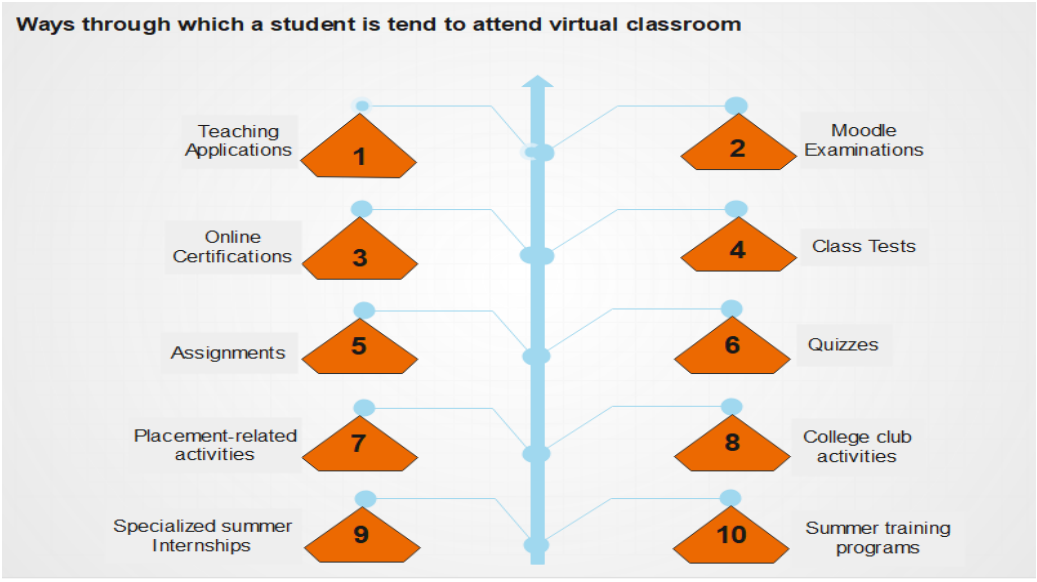

Figure 1. Ways through which a student is engaged in a virtual classroom

Figure 1 represents the number of ways a student is involved in academic acativities in an online platform. Student is engaged in a virtual classroom through moodle examinations, online certifications, assignments and various other aspects. Student is bound to perform all the activities via virtual platform, as if during this pandemic one cannot visit the college physically.

Today various online teaching platforms are available since their relevance has increased due to covid panemic and these platforms have been used for schools and higher education teaching also. Some of the most common used platforms are Zoom, Microsoft Teams, Google classroom etc. and teaching tools are top grade quiz marker, moodle, pro profs, the class marker, online quiz creator, quizpedia, interact, google forms, quest base, socrative, learning pod, test moz, that quiz, edmodo, survey anyplace, riddle, poll everywhere, LMS, kahoot, zoomla quiz deluxe, gnowledge, knowledge mouse, event survey 360, hot potatoes, (Almuqbil, 2021) and so many others which are being used for classes, quizzes, assignments and conducting exams also. These tools have become the basis of students' assessment procedure. KIET Group of Institution, Delhi-NCR, Ghaziabad conducted various workshops, FDPs and training sessions to enable their faculties to use these online plateforms and tools effectively.

III. Research Methodology

The COVID-19 pandemic has encouraged a remarkable change in the education system throughout the world. To continue with the education and learning of students from various universities, the concept of e-learning (Shahzad, 2021) is adopted by almost every country in the world. E-learning has come across with both advantages and disadvantages in various ways. Hence, it has impacted both the student's and the faculty's teaching via the virtual platform in various ways. Few have resulted in physical problems and few with various other aspects related to learning and understanding the concepts.

The survey is designed to fulfill the following set of objectives:

a) To find out the factors that can impact the learning of students through a virtual platform.

b) To consider the most impacting factors out of the list of analyzed factors.

c) To find out the aspects that need to be focused upon, to improve the current learning scenario via a virtual platform.

As per the questionnaire designed and survey conducted, the above literature study and further data analysis found a set of following impacting factors:

1) Interesting
2) Dedicated Hardware Device
3) Ease of using Mobile Phone
4) Training required
5) Technical Glitch
6) Net connectivity
7) Sharing of space at home with siblings
8) Parents working online at home
9) Eye-problems
10) Posture problems
11) Feeling of lack of socializing
12) Satisfaction with virtual classes

A. Sample size and target

The investigation is performed on suspects studying in various Private Institutions in the NCR region. The target sample size at initial was set to 430 out of which approximately 398 respondents validated with appropriate responses. To achieve the subjectivity of this study, an analysis is to be performed, which focuses on finding the most impacting factors related to the constraints of virtual classes.

A total count of twelve factors was taken at initial for the data analysis, but further analysis methods reduced them to seven factors. Data collected through questionnaires is primary, which will further act as a basis of report formulation.

1) Pilot Testing

Pilot testing (Etchegaray, 2011) is one of the major process to be done. To achieve lucidity in the questionnaire and the reliability of variables, several pre-testing methods need to be performed. A count of 70 pre-test surveys was preferred from a non-probability sample on sample respondents.

a) Sampling Procedures

Research relies on a survey technique to gather information via questionnaires distributed to various suspects in the NCR region studying in various Private Institutions. These suspects were mixed who were ranging between 18 to 21 years of age. These 440 participants have distributed properly prepared questionnaires that contained constraints related to virtual classes and issues faced by students. The questionnaire method contained 60 items. Our survey technique

bifurcated questionnaire items into 12 different factor loads relevant to analyze the aspects of how virtual classes are leaving an impact on students' performance.

b) Response Rate

A count of 440 questionnaires was circulated out of which 398 satisfactory responses were received. Though a satisfactory response rate of 90.45% is attained, the rest mentioned issues such as lack of interest, busy schedules, or other personal reasons.

c) Instrument and Measures

While designing the questionnaire, a total count of 12-factor dimensions was taken at initial. The overall process has resulted in mainly 60 items in a questionnaire consisting of both generalized and proposed scenario related questions.

2) Data Analysis

Exploratory Factor Analysis (EFA) (Yong, 2013), (Singh, 2021) was performed to cut off the count of proposed items to some level. It is mainly a two-way approach. In the initial stage, to satisfy the level of reliability and validity of the conception, an individual measurement model has to be examined. Furthermore, with the second stage, the procedure of factor analysis is performed and respondents answered to items according to their excuses.

B. Reliability and Validity Test

This section concentrates more on analyzing the reliability and validity tests on the factors considered while making the questionnaire. Afterward, Cronbach's Alpha is measured for each of them, so that the factors with the highest loading factor are discovered.

1) Reliability

An IBM SPSS Statistics software (version 20.0) (George, 2019) is used to perform a reliability test on 60 items in the questionnaire. Table I depicts the alpha coefficients calculated for each factor involved. To improve the scales, those adapted from previous studies, Cronbach's alpha coefficient (Tavakol, 2011) and EFA were applied. A reliability test for analysis was done on a set of 12 factors, separately. Survey findings stated that a minimum of 05 items should be included for which separate alpha coefficients are to be assigned.

As recommended by testing research theory (Dziuban, 1974), a cut-off level is to be fixed at 0.7. Thus, eliminating the factors that are unsatisfactory in the level of reliability. Multiple recompiling for alpha values is performed further, which helps to cut off the list of items to some extent. This multiple elimination practice helps in improving corresponding alpha values. After recurrence a lot of times, a count of 35 items for 07 constructs (to which, 60 items for 12 constructs were initially proposed) are found most relevant.

TABLE I. RELIABILITY TEST FOR FACTORS RELATED TO VIRTUAL CLASSES IMPACTING THE STUDENTS' PERFORMANCE IN VARIOUS WAYS

S. No.	**Factors Considered**	**Cronbach' Alpha**	The calculated values of Cronbach's Alpha for factors 2, 4, 5, 6, 9, 11, and 12 have met the considerable range of
1	Interesting	0.694	
2	Dedicated Hardware Device	0.845	

3	Ease of using Mobile Phone	0.637	reliability. The considerable values for these factors lie in the range of 0.703 to 0.845. Rest, factors namely 1, 3, 7, 8, and 10 did not meet the set considerable range. These factors are found with loads ranging from 0.505 to 0.694. Thus, these indicate an inadequate level of reliability concerning the impact of virtual classes on student's performance, including other factors. To achieve constancy, unsatisfactory factors were removed and were restricted to further load the factors with a minimum of 0.7.
4	Training required	0.782	
5	Technical Glitch	0.812	
6	Net connectivity	0.731	
7	Sharing of space at home with siblings	0.505	
8	Parents working online at home	0.598	
9	Eye-problems	0.756	
10	Posture problems	0.679	
11	Feeling of lack of socializing	0.703	
12	Satisfaction with virtual classes	0.828	

C. Exploratory Factor Analysis (EFA)

Similar to factor analysis, an appropriate methodology is utilized to determine the dimensionality of 60 items scale. The very famous Kaiser-Meyer-Olkin (KMO) and Bartlett's Test (Galgalikar, 1994) are opted by most researchers to validate the robustness for each factor analysis and sampling adequacy procedure. Table 2 depicts KMO calculation of sample adequacy (Nunnally, 1994) as (0.858) which is approximately 1. Furthermore, while applying Bartlett's Test of Sphericity, a considerable value (p=0.000) is received i.e. approximately 0.05 (such that p-value <0.5). Hence, it can be stated that the sample and factors extracted are now more optimized and adequate.

TABLE II. KMO AND BARTLETT'S TEST

Test		**Adequacy**
Kaiser-Meyer- Olkin Measure of Sampling Adequacy		0.858
Bartlett's Test of Sphericity	Chi- Square	10754.602
	Significant Value	0.000

IV. Survey findings

This section represents the findings that need to be drawn out of the survey conducted via questionnaire. The results of the survey can be depicted in figure 2 & 3. After applying reliability tests on the factors considered at initial, a total count of 07 factors are found which are more optimal for the survey findings. Tables I and II depict the optimal count of factors that can be taken further for analysis (consider figure 1). The factors that are most encountered can

be namely, dedicated hardware device, training required, technical glitch, net connectivity, eye problems, feeling of lack of socializing, and satisfaction with virtual classes.

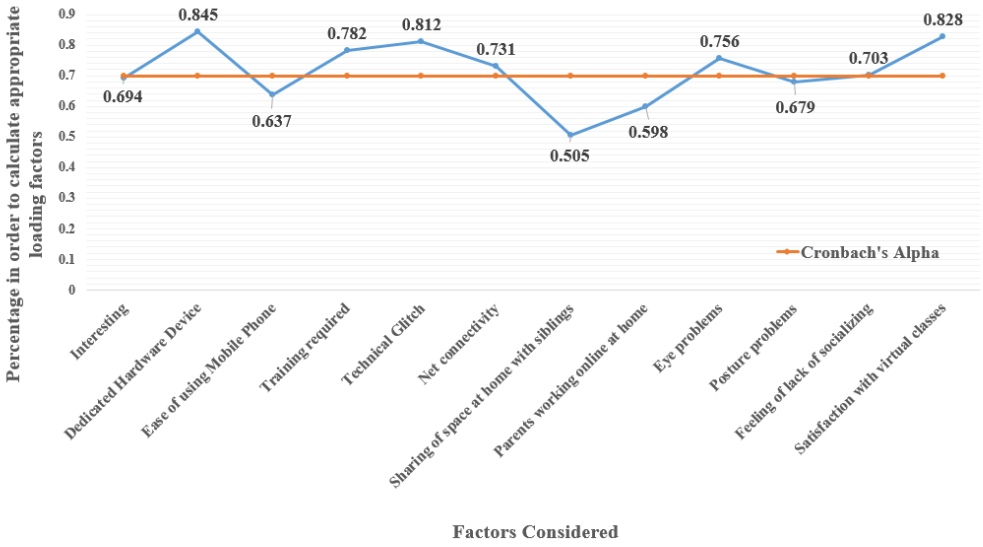

Figure 2. Open-Source Factor Analysis for suggested 07 factors using Cronbach' Alpha

Figure 2 represents the results of open-source factor analysis for the factors taken at initial using Cronbach's Alpha. in figure 2, the primary value of Cronbach's Alpha is set as 0.7 and all the factors whose analysis falls below this value are neglected for further analysis. Hence it can be seen that the factors, such as interest, ease of using a mobile phone, sharing of space at home with siblings, parents working online at home, and posture problems, are neglected.

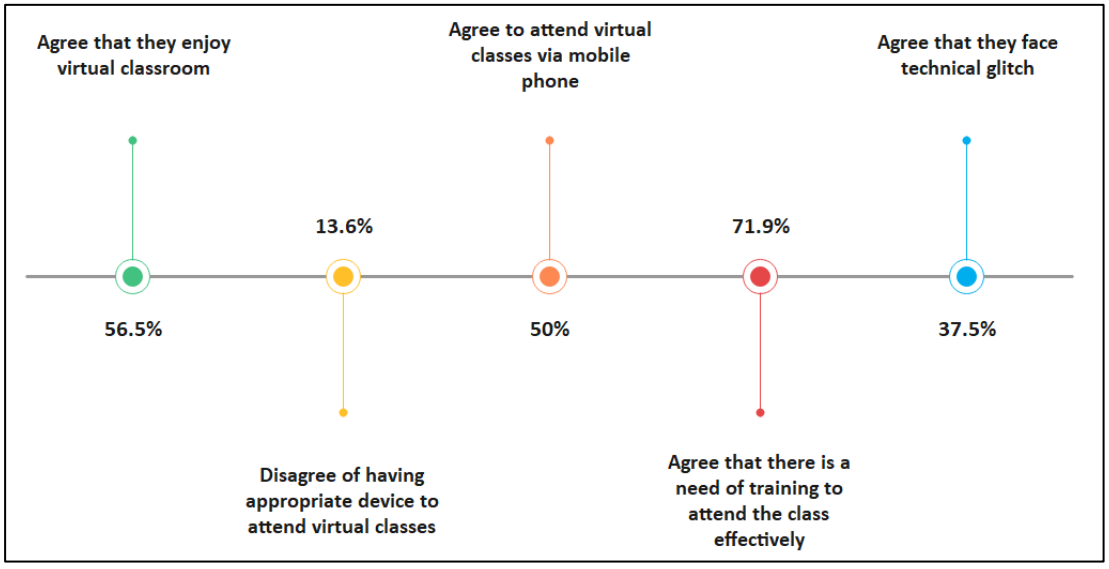

Figure 3. Survey summary (student's centric constraints of virtual classes)

Figure 3 represents the survey summary drawn out of the questionnaire sent to students. The respondents were undergraduate students of engineering, who are taking classes via a virtual platform. Figure 3 concludes the percentage of students who agree on different constraints related to virtual classes. It is seen that only 56.5% of students agree that they enjoy taking

virtual classes. 13.6% disagree with having an appropriate device to take the virtual class. It can be seen that around 50% of students usually opt for mobile phones to attend classes in a virtual model. 71.9% agree that there should be some training session provided by the institute so that they can attend the classes effectively and make the maximum out of it. Since network glitch can occur anytime, 37.5% of students agree that they faced it at times.

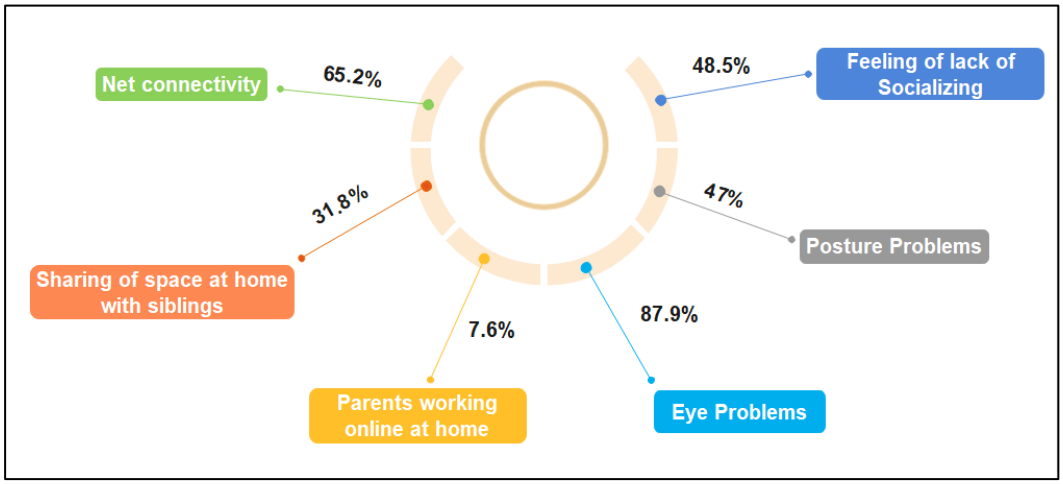

Figure 4. Summary report (problems faced by students during virtual classes)

There are a lot more constraints regardless of having a training session or having an appropriate hardware device to attend the virtual class. Figure 4 concludes the most encountered problems to the students' while attending classes virtually continuously the whole day. The problems that generally students faced were related to several eye disorders and network connectivity. It can be depicted from the figure 4 that 87.9% of students faced eye problems as they needed to focus on the screen most of the time, to attend the class. 48.5% feel that they lack the socializing factor because they need to get engaged in a virtual class, other than socializing at times. 47% of students feel uncomfortable sitting at a place and attend classes continuously, hence, a larger number of students are facing posture problems. Rest, 31.8% are facing issues with space at home with their siblings. And, 7.6% have parents working online at home. Similarly, results can be drawn out from figure 4, upon the information collected via survey.

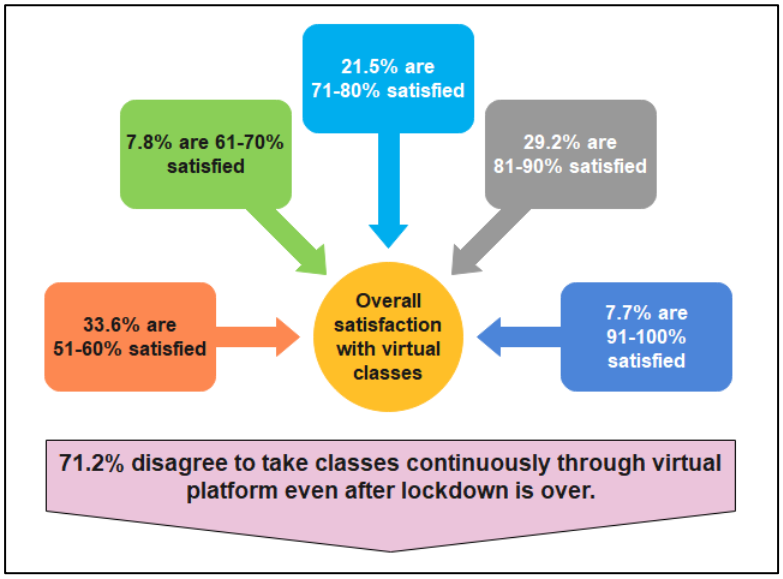

Figure 5. Overall satisfaction of students received via survey

Figure 5 concludes the statistics drawn out from the survey upon the satisfaction level of students regarding virtual classes. It can be concluded from figure 4 that students are not that satisfied with continuous classes on a virtual platform. From figure 5, it can be seen that only 7.7% of students are 91-100% satisfied with the virtual platform to attend regular classes, the rest feel it as inadequate. Also, 71.2% disagree to take classes continuously through the virtual platform even after the lockdown is over. Hence, it is depicted from figure 4 that very few students are satisfied with the virtual platform of attending classes.

V. Conclusion and Future Scope

The pandemic (COVID-19) has changed the education system worldwide, including more ways to conduct events and classes via a virtual platform and a need is strongly felt for the student and teacher to improve the teaching and learning scenario in virtual mode. Though online teaching helps the teachers and learners to keep pace with their own speed as recoding of lectures and PPT's are available after class, and flexibility in arranging extra, remedial or revision classes is also an advantage but some problems with virtual classes cannot be overlooked like social isolation, time management, health issues of eyes and back etc. and becoming non-responsive and difficulty in keeping self-motivation high for engaging in virtual classes. It is hoped the by the course of time teachers and students needs to learn and develop the more effective ways to handle these problems.

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