

Perception About Online Classes Specific to Discipline and Living Locality of Students: A Cross-Sectional Study

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ABSTRACT

Online education has gained immense popularity among the working people and students pursuing higher education. Various renowned universities all over the world are offering online degrees and diplomas to all people through digital technologies. This enhances the concept of online classes due to the complete shutdown of educational institutions for an indefinite COVID-19 pandemic situation. Though the online classes are an immediate and emergency paradigm shifting in teaching and learning, it has certain drawbacks that concern the student to a larger extent. To examine the effects of online classes in terms of quality, comfort, and compatibility, this study analyzes the students' perception of various arts, science, and engineering colleges. Drawing on data from various students and its statistical test has inferred various challenges faced by the students with respect to their discipline and living locality. The result of statistical analysis recommends more improvisations and special considerations to the educational institutions to make this mode a viable solution.

KEYWORDS

Online Class, Statistical Analysis, Teaching-Learning, Video Conferencing, Web Based Learning

INTRODUCTION

In the last two decades, the Internet has become the non-existent into the largest and most accessible database of information ever created (Mueller-Langer et al., 2020). The Internet has changed the way people communicate with others, purchase items/ products, socialize, gain knowledge, and learn. Much more than that, a new twist on online learning/ education is changing the face of traditional classrooms and making education more accessible than before (Alghamdi et al., 2020). In online

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education, the students can learn through computers/smartphones/tablets/ laptops connected to an internet facility in their home (Bourne et al., 2005). This online education has become more popular for many non-traditional students, such as those working in companies/ industries or who want to work full-time to raise their family standards. For instance, world-renowned universities/ multi-national companies/ research centers offer online education through educational sites such as Coursera, edX, udemy, udacity, Edureka, etc. This education forum provides online education in the form of degrees and diplomas specific to courses and disciplines worldwide to all people in various languages.

Recently, in India, the online education through SWAYAM - NPTEL (National Programme on Technology Enhanced Learning), an initiative taken by the Ministry of Human Resource Department (MHRD), the Government of India together with Indian Institute of Technology (IIT) has an overwhelming response among the students. NPTEL offers courses by IIT, the Indian Institute of Management (IIM), and Indian Institute of Science (IISc) professors and industry experts from multi-national companies. In all the education mentioned above, the teaching, learning, and assessment process are used with some specific digital technologies provided through an online portal of the host university.

In general, “Online education is e-supported learning that relies on the internet for teacher and student interaction with the distribution of class materials” (Allen & Seamen, 2013). Through this online education, there are infinite ways to teach and learn outside traditional classrooms and outside college campuses. Online education provides learning through interactive audio, video, text, animations, virtual training environments, and live chats with professors. Online learning typically requires 10hrs per week to read lecture materials and submit assignments and tests/quizzes. It is a rich learning environment with much more flexibility than a traditional classroom when used to its full potential.

On the other hand, the unprecedented events from January 2020 to June 2020 due to the novel Coronavirus- 2019 have put the education sector in the spotlight like never before (Bright et al., 2020). All over the world, the educational institutions have closed in 107 countries, affecting more than 860 million students’ education. Most institutions have canceled school and college board examinations per the Government order (Bright et al., 2020). The schools and colleges offer online classes to the students through video conferencing tools such as WebEx, Zoom, and Google meets using electronic gadgets connected to the internet.

Though the online classes are an alternate solution for traditional classrooms during this pandemic, they have more physiological, infrastructural, and economic drawbacks as follows:

1. Social isolation.
2. Self-motivation and time management in attending classes.
3. Proxy during assessment.
4. The theory focused on teaching rather than practice.
5. Lack of interaction and face-to-face communication.
6. Inaccessible to rural students with poor network coverage.
7. Lack of accreditation & quality assurance.
8. Most suitable for objective type assessment rather than subjective.

In addition, the students are required to be available throughout the day in traditional classrooms for a maximum of 4 to 5 hours per day. Though the concept of online classes evolved from online education, it has more differences of opinion between the students and faculties. Moreover, the students require high-speed internet connectivity, electronic gadgets that supports installing video conferencing applications, audio devices, etc. Even more, for the best quality video and audio during the lecture hour, all you need is 4G connectivity without any network distraction throughout the lecture hour. In particular, the student who lives in a rural area still has 3G network connectivity, and in some places, they have more power cut-off problems. Further, the online classes are limited to specific disciplines.

This makes it a major challenge for the students to participate in online classes. Henceforth, this study analyzes the students' perception of online classes and their comfort in learning rather than traditional classrooms concerning their discipline and living locality.

The remainder of this paper is organized as follows. First, the research methodology is presented along with the sampling, research hypothesis, etc., followed by the data analysis. Subsequently, discussions and conclusions of the paper are identified.

RESEARCH METHODOLOGY

The purpose of this study is to analyze students' perception of online classes among the students who pursue their degrees in colleges located in and around Madurai city, Tamil Nadu (South India), an Indian state. Madurai is a major and third largest city of Tamil Nadu (MC-2020), an Indian state with 2 Medical colleges, 12 Engineering colleges, 11 Arts and Science colleges, and a Government Polytechnic College (MC-2020). The quantitative approach has been used to employ a standardized approach of an online questionnaire to collect the survey among the students of Arts, Science, and Engineering College as online classes are primarily compatible with them. The questionnaire contains two sections, namely online lectures and assessment, with the consideration of 7 and 5 factors, respectively in each section, as shown in Table 1.

Each section contains various questions, as shown in Table 1. The questions are marked with L1 and T1, etc., in the first column of Table 1 for straightforward representation throughout this study. A Statistical Package for Social Sciences (Howitt & Cramer, 2020) has been used to analyze the answers provided by the students and formulate their perception of online classes. The questionnaire contains a typical five-point Likert scale ranging from Strongly Agree to Strongly Disagree, with its equivalent numerical value ranging from 5 to 1. The following tests and statistical techniques were used for the perception:

1. Frequencies and percentages to describe the demographic classification of respondents.
2. Cronbach's alpha reliability to measure the strength of correlation and coherence between questionnaire items.
3. Chi-square analysis measures the statistical significance of students' opinions on online classes concerning their discipline and living locality.

Table 1. Factors considered for this study

Online Lectures	
L1	Do you feel online classes are more comfortable than the black board teaching
L2	Do you feel there is network issues during the lecture hour even with high speed connectivity
L3	Do you like the online classes in taking up the Mathematical subjects and Programming papers such as C, C++, Java etc.
L4	Do you think, doubt clarification with the faculty is more easier in the online medium
L5	Do you think, students are highly engaged throughout the online lecture class.
L6	Do you actually gain any knowledge through this online classes
L7	Do you strongly recommend these online classes can be taken up in the future
Online Assessment (Assignment / Test)	
T1	Do you feel submitting the assignments doesn't have any proxy with your friends
T2	Do you feel the online tests are more compatible than the written test with a supervisor
T3	Do you think, this online test has more chances to do malpractice than the test with supervisor
T4	Do you have enough time to submit your answers during the online examinations
T5	Do you think descriptive type questions can be easily answered in this online examinations.

4. Relative importance to rank the issues faced during online lecture/ factor/ opinion of the students as given in Table 1.
5. Factor analysis to identify the reliability and the small number of factor groupings used to represent the set of many inter-related factors.

Sampling

The current study population comprises students from various arts, science, and engineering colleges in Madurai city. Due to a large population of students, only a random sample was chosen from various disciplines for the analysis. The questionnaire was given to 450 students from May 1, 2020, to May 30, 2020. Table 2 shows the classification of respondents concerning demographic variables of their personal information along with the network connectivity and devices used for their online classes.

Table 3 shows the discipline-wise usage of video conference tools used by the students to attend their online classes. Most engineering college students used Google meet as it supports 150 students to a maximum duration of 1.5hrs when compared to zoom with 100 participants to a maximum duration of 40 minutes. In comparing the total usage of tools, the zoom has more access than the other tools. However, Microsoft Teams, Skype, and other tools have less usage among the students due to their awareness and comfort.

Reliability Analysis

Cronbach's alpha test is the golden tool used to verify the reliability of the data collected through the online questionnaire (Croasmun & Ostrom, 2011). This test has been used to verify the internal consistency of various factors considered under the online lecture and online assessment used in this study. Table 4 shows the factors involved in the study; those values are more significant than 0.60 for Cronbach's alpha. From Table 4, it is clear that the data collected through the questionnaire is acceptable and valid for the study as proposed by Hair et al., 1998.

Data Analysis and Findings

To analyze this study's major objective, i.e., the students' perception of online classes concerning their discipline and living locality. Chi-square, Factor analysis, and Relative importance have been used to analyze the data collected through an online questionnaire.

Chi-Square Analysis

A chi-square (χ^2) test (Goodman, 1971) is a statistical hypothesis test used to determine whether there is a statistically significant difference between the expected and observed frequencies in one or more categories. The test's purpose is to evaluate how likely the observed frequencies would be assuming the null hypothesis is true. This test is applied to the collected survey of data to analyze the student opinion on online classes with respect to discipline and living locality. To analyze with respect to discipline, the null hypothesis and alternate hypothesis are framed as follows:

H_0 : No significant difference between the students' opinions on online classes with their discipline.

H_1 : There is a significant difference between the students' opinions on online classes with their discipline.

Table 5 shows the statistically significant difference between the observed and expected frequency distribution details of students' opinions on online classes with respect to their discipline. From Table 5, it is clear that the Pearson Chi-Square value is more than .005; hence the null hypothesis is rejected, so there is a significant difference between the students' online opinions of their respective

Table 2. Demographics details of respondents

	Frequency	Percent	Cumulative Percent
Gender Ratio			
Male	256	56.9	56.9
Female	194	43.1	100.0
Total	450	100.0	
Age			
Below 17	8	1.8	1.8
18 to 21	406	90.2	92.0
Above 21	36	8.0	100.0
Total	450	100.0	
Medium Studied			
English	422	93.8	93.8
Tamil	28	6.2	100.0
Total	450	100.0	
Discipline			
Engineering	298	66.2	66.2
Arts	112	24.9	91.1
Science	40	8.9	100.0
Total	450	100.0	
Area of Living			
Rural	119	26.4	26.4
Urban	331	73.6	100.0
Total	450	100.0	
Network connectivity			
4G	397	88.2	88.2
3G	39	8.7	96.9
2G	14	3.1	100.0
Total	450	100.0	
Type of Device used for Network connectivity			
Broadband	68	15.1	15.1
Dongle	7	1.6	16.7
Jio fiber	90	20.0	36.7
Mobile Hotspot	285	63.3	100.0
Total	450	100.0	

disciplines. As stated earlier, the online classes are limited to specific disciplines, which have been proved statistically through Table 5. Further, to analyze the statistically significant difference between the students’ opinions on online classes and living locality, the null and alternate hypotheses are framed as follows:

H_0 : No significant difference between the students’ opinions on online classes with their living locality.

Table 3. Video conference tools used by various disciplines of students

Discipline	Zoom	Gmeet	Webex	Microsoft Teams	Skype	Hangout	Connect	BlueJeans
Engineering	81	137	61	12	4	1	0	1
Arts	71	4	13	6	3	7	6	2
Science	17	6	14	0	0	1	1	1
Total	169	147	88	18	7	9	7	4

Table 4. Reliability Statistics (Cronbach's alpha study)

Variables (factors considered in this study)	Cronbach's alpha
Online Lectures	0.766
Online Assessment/ Test	0.893

Table 5. Chi-square analysis for the students' opinions on online classes with their discipline

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	18.473 ^a	8	.018
Likelihood Ratio	18.043	8	.021
Linear-by-Linear Association	5.656	1	.017
N of Valid Cases	450		

H_1 : There is a significant difference between the students' opinions on online classes with their living locality.

The statistically significant difference between the observed and expected frequency distribution details of students' opinions on online classes with respect to their living locality are shown in Table 6. As per Chi-Square analysis, the null hypothesis will be rejected when the p-value is less than 0.005 ($p < 0.005$), and the alternate hypothesis will be accepted and then vice-versa. From Table 6, it is clear that the $p\text{-value} > 0.005$, and hence the alternate hypothesis, is accepted. So there is a significant difference between the students' opinions on online classes with their living locality. As stated earlier, students living in rural and village areas have lower internet bandwidth and face issues during online classes. This has been proved statistically through Table 6.

Table 6. Chi-square analysis for the students' opinions on online classes with their living locality

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.991 ^a	4	.092
Likelihood Ratio	8.259	4	.083
Linear-by-Linear Association	.481	1	.488
N of Valid Cases	450		

Relative Importance

To analyze the issues faced/ factor/ opinion of the student towards online classes, relative importance has been used to rank the factors (Table 1) with respect to a class interval of the Likert scale from lower order to higher order as given in equation 1 and equation 2. Equation 1 identifies the class interval of the Likert scale value, and equation 2 categorizes the Importance Level (based on the class interval). Then the factors are ranked based on the mean value obtained for the factors in the questionnaire using the Importance level as given in equation 2. The factor ranked to be high is the major challenge/ issue/ opinion about online classes by the student. Similarly, the factors which are ranked as medium and low are next to high based on their class interval:

$$C_I = \frac{\text{Maximum score} - \text{Minimum score}}{\text{Number of score}} = \frac{5 - 1}{3} = 1.33 \quad (1)$$

$$I_I = \begin{cases} \text{High} & \text{if } 1.00 \leq C_I \leq 2.33 \\ \text{Medium} & \text{if } 2.34 \leq C_I \leq 3.67 \\ \text{Low} & \text{if } 3.68 \leq C_I \leq 5.00 \end{cases} \quad (2)$$

High degree = 1.00 to 2.33

Medium degree = 2.34 to 3.67

Low degree = 3.68 to 5.00

The relative importance of factors is listed in Table 7 as per the student opinion given in the online questionnaire. According to Table 7, the students feel the online classes are not compatible and comfortable with traditional classroom teaching and are ranked to be very high. The following nine other factors are ranked medium as listed in Table 7, where many factors are included. Finally, only two factors, i.e., network connectivity and supervised examination, are considered to be low.

Factor Analysis

To identify the reliability and a small number of factor groupings used to represent the set of many inter-related factors, KMO and Bartlett's test has been used (Yong & Pearce, 2013; Peri, 2012). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is a statistic used to determine the sampling adequacy of data used for factor analysis. This indicates the proportion of variance of the observed values that might be caused by underlying factors considered for analysis. The KMO test allows us to ensure that our data are suitable to run a Factor Analysis and therefore determine whether or not we have set out what we intended to measure. The statistic that is computed is a measure of 0 to 1. Interpreting the statistic is relatively straightforward; the closer to 1, the better. For reference, Kaiser put the following values on the results:

- To 0.49 unacceptable
- 0.50 to 0.59 miserable
- 0.60 to 0.69 mediocre
- 0.70 to 0.79 middling
- 0.80 to 0.89 meritorious
- 0.90 to 1.00 marvelous
- So more 0.7 will be enough

Table 7. The relative importance of factors listed based on the students' opinions

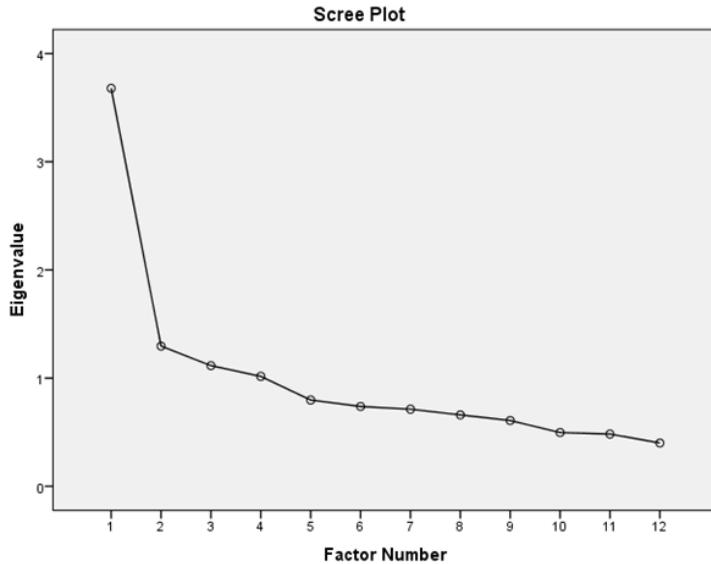
Q. No	Factors	Mean	Std. Deviation	Item Importance	I_i
L1	Do you feel online classes are more comfortable than the black board teaching	2.29	1.097	1	High
L3	Do you like the online classes in taking up the Mathematical subjects and Programming papers such as C, C++, Java etc.	3.00	1.341	2	Medium
L5	Do you think, students are highly engaged throughout the online lecture class.	3.03	1.266	3	Medium
L7	Do you strongly recommend these online classes can be taken up in the future	3.06	1.314	4	Medium
L4	Do you think, doubt clarification with the faculty is more easier in the online medium	3.16	1.282	5	Medium
T1	Do you feel submitting the assignments doesn't have any proxy with your friends	3.36	1.094	6	Medium
L6	Do you actually gain any knowledge through this online classes	3.37	1.091	7	Medium
T4	Do you have enough time to submit your answers during the online examinations	3.38	1.150	8	Medium
T5	Do you think descriptive type questions can be easily answered in this online examinations.	3.41	1.168	9	Medium
T2	Do you feel the online tests are more compatible than the written test with a supervisor	3.50	1.204	10	Medium
T3	Do you think, this online test has more chances to do malpractice than the test with supervisor	3.84	1.081	11	Low
L2	Do you feel there is network issues during the lecture hour even with high speed connectivity	4.03	0.881	12	Low

Table 8 shows the KMO and Bartlett's test results on student opinion on online classes. As stated, the KMO and Bartlett's test is used for factor analysis of what the observed value depends on. From Table 8, the KMO value is 0.845, which is meritorious enough to consider for factor analysis, showing that the data collected are reliable. Further, Bartlett's test of sphericity tests the hypothesis that the correlation matrix is an identity matrix, which would indicate that the variables are unrelated and therefore unsuitable for structure detection. Also, it indicates a strong relationship between the variables. Small values (less than 0.05) of the significance level indicate that factor analysis may be helpful with your data by rejecting the null hypothesis suggesting that the variables in the correlation matrix are not an identity matrix and are uncorrelated. This indicates a strong relationship among the variables making it appropriate for factor analysis. Based on orthogonal transformation and varimax adopted using principal component analysis, the factors are plotted based on Eigenvalue, as shown in Figure 1. From Figure 1, it is clear that the primary factor that concerns students' opinions is that online classes are not comfortable and compatible as traditional classrooms. This has been shown with maximum Eigenvalue, and the other factors have medium-scale value. From the analysis, this

Table 8. KMO and Bartlett's Test on the students' opinions

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.845
Bartlett's Test of Sphericity	Approx. Chi-Square	1084.600
	df	66
	Sig.	.000

Figure 1. Factor analysis using Principal Component analysis on students' perception



study strongly recommends that educational institutions improvise the online mode of the teaching-learning process to be viable to all the students enrolled in the courses.

CONCLUSION

Online education is becoming more popular with people working in industries and companies pursuing higher education. As a result, the online classes have evolved as a substitute to favor educational institutions in the teaching and learning process rather than traditional classrooms due to lockdown during this COVID-19 pandemic. Though the online classes are not new to the world, they do not have much response among the students, mainly those living in rural areas and specific disciplines. To analyze the challenges and effects, this study collects an online questionnaire from arts, science, and engineering college students through a standardized survey approach. Statistical analysis using Chi-Square, relative importance, and factor analysis infer that online classes are not comfortable and compatible with the traditional classroom. This study recommends a significant improvisation and special consideration to the educational institutions to make this mode of teaching-learning process a viable solution. In future, the statistical analysis on efficiency of distance education program has to be performed for the viability of the course and understanding by the students.

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