COVID-19: A Framework for Effective Delivering of Online Classes During Lockdown

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Received: 28 September 2020 / Revised: 25 November 2020 / Accepted: 1 December 2020 /
Published online: 30 January 2021

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Abstract

The world as we know it has changed over a short period of time, with the rise and spread of the deadly novel Corona virus known as COVID-19, the world will never be the same again. This study explores the devastating effects of the novel virus pandemic, the resulting lockdown, thus the need to transform the offline classroom into an online classroom. It explores and describes the numerous online teaching platforms, study materials, techniques, and technologies' being used to ensure that educating the students does not stop. Furthermore, it identifies the platforms, technologies which can be used to conduct online examination in a safe environment devoid of cheating. Additionally, it explores the challenges facing the deployment of online teaching methods. On the basis of literature review, a framework was proposed to deliver superior online class room experience for the students, so that online classroom is as effective as or even better than offline classrooms. The identified variables were empirically tested with the aid of a structured questionnaire; there were 487 (according to Craitier and Morgan) 150 number of respondents who were purposefully sampled. The results indicate that students prefer the multimedia means of studies. As a result of binary logistic regression, poor internet connection, awareness on COVID-19, enough sources of materials, recommends massive open online course, favourite online methods, and satisfaction with online study are significant in the model or attitudes towards delivering of online classes during lockdown COVID-19 pandemic at 5% level of significance. The study recommends online teaching methods, but finally, the study concludes that satisfaction with online study is significant in the model or attitudes towards delivering of online classes during lockdown COVID-19 pandemic at 5% level of significance.

Keywords COVID-19 · E-learning tools · Online learning · Binary logistic regression

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Introduction

The Corona virus pandemic is a strange viral infection that is highly transmittable especially from person to person. The COVID-19 infectivity that is caused by a completely unique mental strain of corona virus was first detected in Wuhan, China, in the last week of December 2019 and acknowledged a world health emergency of international concern by the World Health Organization on January 30, 2020. The World Health Organization has confirmed the fast-moving coronavirus outbreak in China, a “world health emergency of worldwide concern” (<https://doi.org/10.1021/cen-09805-buscon4>). Eventually, the disease continues to spread across the globe, killing many, and collapsing the various economic, educational, and social activities across the globe.

Death rate ranges between 2 and 3%. It is drastically less severe than 2003 SARS (MR 10%) or 2012 MERS (MR 35%) outbreaks. Threat of decease is merely high in older people (above an age of ~ 60 years) and other people with pre-active health conditions, and approximately 80% of individuals have gentle symptoms and get over the sickness in 2 weeks. The majority of the symptoms are often treated on time medication (John Hopkins Center for System Science and Engineering (Live dashboard), as reported on March 11, 2020).

In view of the forgoing, all institutions of learning across the globe are subjected to an imminent and unavoidable indefinite break. This is an attempt to stop the virus from affecting the students or the teachers. This however has brought about lackadaisical attitudes among the students at home because they are idle and thus thinking nothing but evil.

Most countries across in the world including my country, Nigeria, have developed a way of engaging this students at home, and in some developed countries like the USA, students have resume back to school facelessly (via online). In Nigeria; a platform was developed online for educational used by students and any other researcher (academia.nitda.gov.ng). This is a laudable initiative but hampered by resources like electricity, internet, and to some awareness.

Consequently, all hands are now on desk, reviewing academic online platforms and updating it to meet up with the peculiarities of our day-to-day challenges while making it easy for studies and evaluations of student’s academic performance. This is the quest for this research work. Research problem: the global method of teaching is physical dialogue, whereby students and teachers will meet on a scheduled venue and physically interact. With the advent of these pandemic, public gatherings are prohibited; this makes it impossible for teaching to continue, so long as there is going to be person-to-person contact.

Hence, the need for a platform that will substitute the obsolete means of teaching in an effective and efficient method with the capability of evaluating students academic performance is imminent. Research gap: there are no academic researches on this topic; researches are yet to study online classes platforms, etc.

Objectives: The study explores and describes the present state of online classes, opportunities, and challenges. It is a novel research on the techniques and method adopted by teachers to bring the offline classroom online. The key goal of the learning is to assess socio-demographic and related factors on the attitudes towards delivering of online classes during lockdown COVID-19 pandemic in India.

Literature Review

The approach of online-learning as an aspect of the synergistic study worldwide incorporates Web 2.0 advances, which are in the main used by our understudies and are presently enhancing into the homeroom. Teachers state that these innovative advances extremely help increments to their DE homerooms as they will upgrade learning among our technically knowledgeable understudies, reflecting the usage of those advances in their day-by-day lives. Web 2.0 main advances incorporate wikis, sites, broadcasts, informal communities, and online video-sharing destinations like YouTube. Teachers and scientists can foresee that new advances will in any case be presented, which can require transformation by the two understudies and educators, upheld by examination by analysts on their viability. It is essential to appear for “hints on how e-learning advances can turn out to be ground-breaking impetuses for change additionally as devices for updating our education and instructional frameworks” (Shroff & Vogel, 2009, p.60).

The developing of instructional stages, likewise referenced as Knowledge Management Systems (KMS), is another advancement in ongoing DE history. Saadé & Kira (2009) depict Learning Management Systems (LMS) as a structure that has educator instruments, learning measure apparatuses, and a store of information. Tests of KMS stages incorporate WebCT, Blackboard, and DesireToLearn, which have risen on the grounds that the best three LMS are unavoidable in the present DE condition. Last Modular Object-Oriented Dynamic Learning Environment (Moodle) has developed as a substitution to LMS open-source framework, a free option to the previously mentioned stages (Unal & Unal, 2011). It is fundamental that the devices executed help the course tasks, exercises, and substance (Singh et al. 2010; Smart & Cappel, 2006). “Unmistakably, innovation upheld learning conditions can possibly flexibly instruments and structure to modify training” (Shroff & Vogel, 2009, p. 60). The researchers used in this investigation are presented to Blackboard LMS through which understudies partake in conversation gatherings, online diaries, Wikis, Web-based testing and practice tests, virtual groups, YouTube, and other intelligent devices.

The idea of online-learning and hence the plan to utilize Moodle in college option came after a progression of global temporary jobs we were included and after a progression of on-line classes and stage setup for improving instructing ventures. There are numerous advantages of utilizing online instruction together with correspondence, collaboration between understudies, bunch improvement, and a superior admittance to information. Regardless of those advantages, numerous Romanian colleges regularly consent to stay in customary instructing without extra help. Moodle might be a learning stage initially planned by Martin Dougiamas (first form of Moodle was delivered on August 20, 2002). Moodle, as a solid open-source e-learning stage, was utilized and created by worldwide cooperative exertion of global network. Moodle is implied and proceed with improved to flexibly instructors, directors, and students with one vigorous, secure, and incorporated framework to make customized learning conditions. Presently, on March 27, 2014, Moodle 2.6.2 was launched. We consider Moodle a Web-based versatile community-oriented learning condition that contains all parts portrayed by Wang et al. (2004): conversation gathering and one-on-one companion help client model, collective methodology model, and versatile segment. A few creators were likewise inquisitive about cooperation and human correspondence on a Web-based collaborative learning environment (Zhang et al. 2004), while different creators call these virtual learning situations (Knight & Halkett, 2010). Comparative encounters of utilizing intelligent e-learning instruments as Moodle were portrayed by different creators (Beatty & Ulasewicz, 2006). They all pointed in their papers (Shen et al., 2006) that utilizing Moodle

can build up understudies' psychological blueprint, help to develop their insight, advance understudies' uplifting mentalities towards talking about and helping out companions, and increment understudies' aptitudes to embrace deep-rooted learning by utilizing the information innovation. Options as far as Web-based collaborative learning are given by Pfahl et al. (2001). During this adaptable online network for learning, understudies collaborate with course assets and are prepared to grow new abilities and to structure their own learning direction. Applying this e-learning stage, we exploited understudy's spare time and their accessibility to spend and structure their activities (Arbaugh et al. 2009) in order to submit schoolwork regarding a firm cutoff time.

Massive open online courses (MOOCs) and open education research (OER) MOOCs are online courses that by and large permit anybody to enrol and complete without any extra fee (at any rate for the fundamental course). Cormier and Siemens [8] contend that they are a possible result of "open educating and study." The degree of receptiveness in MOOCs varies from course to course and if the course is realistic on a MOOC stage, relying on the stage. While numerous cMOOCs offered its substance utilizing open authorizing, other MOOC suppliers just give the substance to privately utilize it as it were. For example, Coursera, single among the main xMOOC stages (Kibaru, 2018), expresses that the texture is "just for your very own, non-business use. you'll not in any case duplicate, imitate, retransmit, disseminate, distribute, monetarily abuse or in any case move any material, nor may you alter or make subsidiaries mechanism of the material" (Rabe-Hemp et al., 2009). In this manner, yet a "by item" of the open education development, MOOCs appear to be less open than OERs, uninhibitedly available instructive substance, which are for the most part delivered with open authorizing.

E-learning Tools for Distance Education

With the growing concerns over COVID-19, many school districts have moved classroom instruction online for the foreseeable future. We understand that this change can present challenges on many levels for educators, administrators, students, and families. The following recommended tools may be helpful in making the transition to digital learning during this difficult time. These resources include general e-learning tools for educators, subject-based tools for students, and extensions to assist students with learning differences. Almost all of these resources are free, with the exception of a few inexpensive tools/available free trials (United Nations Educational, Scientific and Cultural Organization (UNESCO). 2020.)

Tool name	Description	Links	Cost
Age of Learning	Offering free access to ABCMouse, ReadingIQ, etc. to those affected by COVID-19 closures	https://www.ageoflearning.com/	Free
Biteable	Simple video creation/editing tool	https://biteable.com/	Free
Canva	Tool to design graphics, infographics, etc	https://www.canva.com/	Free
EdModo	Tool for communicating and sharing classroom content	https://go.edmodo.com/teachers/	free
Factile	Tool to create review games, like Jeopardy	https://www.playfactile.com/	Free
Khan Academy	Online lessons and resources for K-12 educators to use, as well as AP/SAT prep	https://www.khanacademy.org/	Free
Nearpod	Tool for creating simple, interactive presentations that can easily be shared	https://nearpod.com/how-it-works/ E-Learning: https://bit.ly/2IKeWyZ	Free

Tool name	Description	Links	Cost
Padlet	Tool for educators to create digital bulletin boards or webpages	https://padlet.com/	Free
TesTeach	Tool for educators to create interactive presentations, lessons, or projects	https://bit.ly/3cWw7ev	Free
WIX	Simple, free website builder	https://www.wix.com/	Free
Code.org	Activities and resources for K-12 students to learn basic computer science/coding	https://code.org/	Free

SOURCE: United Nations Educational, Scientific and Cultural Organization (UNESCO), 2020

Descriptive Analysis of Tools of Online Class MOOC

1. **Impartus:** This is the main video proposal for OER and training. Around 130 higher institutions in India are currently using this platform (<http://www.impartus.com>).
2. **Webex:** Webex is an online tool that allows you to virtually hold meetings without leaving your homes or offices. It only requires a computer with an internet access and a separate phone line. This is a product of Cisco Company and is capable giving access to up to 100 clients at a time. It is free to sign up but requires \$49/month subscription (<http://www.webex.com>).
3. **Zoom:** This is another online livestreaming tool but it is a mobile app. It is available on Android and iOS. While online, you can record sessions, collaborate on projects, and share or annotate one another's screen. It cost \$14.99/month, and it allows meetings recording on the cloud. It has unlimited number of participants, but the meetings can only last for 40 min (<https://zoom.us>).
4. **Google Classroom:** This is an open source Web service provided by Google for education and training with the sole aspire of online evaluation of test and assignment in a paperless way. However, organizations must register their corporate account on G-Suit before they can use this service. The students only need a valid email account to get connected to the class. This is linked to Google Drive, Google Docs, and Gmail for efficient sharing of resources (<https://classroom.google.com>).
5. **Microsoft Teams:** This is designed by Microsoft as an all-round collaborative platform offering: chats, voice, and calling features. It allows instant messaging with inbuilt office 365 for manipulating documents with live stream. All you need to do is to subscribe to the Microsoft 365 business essentials package; however, this package cost \$5/month and per single user (<https://support.office.com>).

Descriptive Tools for Online Classes

Internet learning content is available through various types (text, pictures, sounds, and curios) (Moore & Kearsley, 2012) and kinds of media (versatile, intelligent, account, profitable) (Laurillard, 2002). The educated client can utilize different Web-based learning assets to make a learning domain that suits his own adapting needs (for example, learning styles, singular openness needs, inspiration); moreover, to the information on different kinds of ICT, it is critical to know somebody's very own adapting needs (Grant et al., 2009).

There are many online tools that are already in use to achieve online classes. It depends on the resources available for the organization to subscribe to such online services. Each of

these tools has its own advantages and disadvantages in terms of security, cost, and regional peculiarities. The below table can assist in analyzing some selected tools based on their cost and security.

Tool	Cost	Advantage	Feasibility
Impartus	Free hosting and \$49/module annually	The higher your number of students, the cheaper the subscriptions and have relative authentication system for security	This is feasible in developed countries where internet and power are not a challenge
Webex	Free hosting, \$49/month charged for subscriptions annually	It is capable of connecting up to 100 clients at a time, and it has in build cryptographic security model	This is most feasible to Cisco hardware but not limited to Cisco and requires stable power and internet
Zoom	7-days free trial then you can choose from three different platforms ranging from \$14.99/per month	Real-time feedback, custom support, and job ready skills but limited to only 40 min per session and relatively secured	This is feasible on Android and iOS software. It is a mobile application but limited to only 40 min per session
Google Classroom	Free	Dedicated to only subscribed clients, and features are customized according to clients' wants. Secured with SSL encryption	This is feasible to low-level institutions with financial challenges. It is free and operates on both mobile and computer. It has an embedded examination evaluation software
Microsoft Teams	Free hosting and subscription of \$5/month to all connected clients	Very scalable and user friendly	This is feasible to developed organizations with no financial or manpower-related challenges. It requires a subscription and real-time manipulation of texts/documents using an inbuilt Office365

Descriptive Analysis of Tools of Online Examination

For a complete online classroom, there is a need for an equivalent system/platform in place for an online examination evaluation. Many of such platforms are readily available online. It is left for organizations to analyse the available systems and choose the best that suits their requirements considering the cost and security of the model. Below are some selected tools fitted for that purpose;

1. **TCexam:** This is an open source system for electronic exam. It is also known as computer-based assessment (CBA) and computer-based test (CBT). It is free and does not require additional hardware to run.
2. **Virtualx:** This is a free online exam management information system. It is cloud-based, and it is an open source. It is user friendly and scalable to user requirements.

3. **Moodle:** This is a learning platform or course management system that is aimed at online automation of examinations. It gives the opportunity for lecturers to create their own personal websites. It is free and open source.
4. **FlexiQuiz:** This is a main online test producer that will work without human intervention and mark and grade your quizzes. It is an open source and free. And it is secured with SSL encryption technology.
5. **EdBase:** This is a powerful and flexible tool for online examinations and grading. It is cloud-based and free. It has the feature of creating question bank and autograding. It is easier in generating portable reports in different formats and is secured with SSL encryption technology.

Tabular comparison of online examination tools

Tool	Cost	Cost	Feasibility
TCexam	Free	Does not require additional hardware to run	Feasible to organizations with well-trained system analyst that can be able to use the software in accordance to their requirement
Virtualx	Free	Already on cloud, hosting is not required	This is cloud-based and makes it more portable and flexible but required a professional system analyst for the security of the information on the cloud
Moodle	Free	Very integrated and it operates according to the class size	This is very okay for a class less population; it operates according to class size
FlexiQuiz	FREE	Autograding and secured with SSL encryption	This is an automated software that is flexible according to user requirement, and it is secured with SSL encryption
EdBase	Free	Creates question bank and cloud-based	This is a special package for computer-based examinations, and it has an auto-grading software, and it is free

Challenges of Online Classes

Nowadays, smart KMS (Knowledge Management Systems) and LMS (Learning Management Systems) with technology inbuilt are in demand for increasing the need of self directness. Evidence have shown that students tend to understand better if multimedia (Adnan, 2018) tools are integrated into their teaching. Despite efforts by institutions to adapt the use of internet and ICT in teaching, most especially in the present condition of lockdowns, certain challenges are curtailing these efforts. Viz;

1. Lack of internet in most developing countries, like Africa: this proposed framework is purely online, and as such, reliable internet network is the backbone of its emergence. Most developing countries like Africa do not have sufficient internet network for their citizens, and this is a major setback for e-learning.

2. **Security:** The major challenge of anything online is security. This is because of the fear of cyber-attacks by hackers. Such a proposed framework will be handling students' records and examination results. Any possible breach of access can result to serious information mismanagement. Hence, the need to put a serious security in place.
3. **Lack of infrastructures** like computers and ICT gadgets due to the level of poverty in some regions like Africa: for a successful online classroom, there must be resources to be sufficiently made available. These resources include network hardware, system hardware/software, and human resources, but due to economic factors of some countries, such provisions are relatively impossible and thus, a big challenge for e-learning.
4. **Lack of power supply** in many regions, like Africa: there cannot be technology without electricity and the issue of electricity is a regional challenge to Africans. Most universities in Nigeria were operating strictly on generators because there is no sufficient power supply. This makes it impossible for the students to gain access online as expected because they may not have the means of power supply while out of campus.
5. **Lack of political will** due to corruption in Africa: democracy is now a global rule of law. Though, every region or Country has its way of politics; in Africa corruption has posed major challenge in the development of the region and this makes it unfavourable for developmental trends like; ICT, Power etc.
6. **Lack of scalable policies** by government: In some countries, there are strict policies on the use of ICT; this might be due to the prevailing cybercrimes over the cyberspace and the process of adhering to such policies; it poses a great challenge in the development of educational technologies and other ICT-related platforms.
7. **Lack of ICT knowledge/awareness** among students and lecturers: In some countries and institutions, the knowledge of ICT is very scarce. In fact, some are resisting to accept technology as a modern science. They view the concept of ICT as an attempt to scam and hence, posing a very big challenge in the implementation of any ICT framework to such categories of Institutions/people.

Advantages of Online Classes

1. **Easily accessible:** you can log in anywhere you are, so long as you are online and you are registered on the platform. Unlike the traditional classroom where you have to be at a scheduled venue, to receive lectures physically.
2. **Unlimited access to resources:** Most online-learning platforms are connected to an unlimited number of e-libraries from various academic institutions. Once you have access, you will gain access to unlimited e-books, journals, etc.
3. **Flexibility in learning:** Online-learning platforms simplify the methods of teaching, in the sense that lecturers can leave offline materials and assignments and each student can log in at his/her free time to download and act accordingly.
4. **Sharing of resources is easier:** Resources are easily shared via emails or direct download from the platform. Students do not need to go for photocopies or any physical stress.
5. **Academic collaborations are enhanced:** With the use of online teaching platforms, students collaborate far more than physically been in class. Such collaborations will assist them in group research and efficient time management for academic attainments.
6. **Very portable and comfortable:** Students can log in at their comfort zones. You can be in bed and still connect to the class and situation where you have travelled or lost your

computer; all you need to do is to find another one, connect to the internet, and log in to your classroom to continue your classes.

Possible Solutions to the Challenges of Online Classes

Nowadays, smart KMS (Knowledge Management Systems) and LMS (Learning Management Systems) with technology inbuilt is in demand for increasing the need of self directness (Gibson et al., 2008). Below are some proposed solutions to the aforementioned challenges;

1. **Reliable internet network:** The government should provide internet networks across the country at a subsidize rate. It is recommended that students been given free access to the internet while other citizens should pay either monthly or annually as proposed.
2. **Sufficient power supply:** Government should make available electricity to its citizens at a subsidise rate. This will bring about Industrialisations and thus, providing job opportunities among graduates.
3. **Fighting corruption:** The government should establish strong institutions for fighting corruption. These institutions should be independent and should have members from European, African Union (EAU), United Nations (UN), and any other intentional agency that is capable of checkmating the international affairs of a country.
4. **Flexible government policies:** Government should make their policies very favourable to their citizens. Government should be reviewing their policies routinely to curtail the shortcomings in their policies.
5. **Strong ICT awareness:** Students and the teachers should be train on ICT trends. The immediate societies should also be given awareness on the positive impacts of ICT in their environments.

Methodology

The study area will conduct in India and other country. The study populations are all populations who are delivering of online classes during lockdown COVID-19. A total of 150 respondents were included.

Study Design

A cross-sectional study design would be carried out. Cross-sectional survey design is mainly used for the collection of information on and related socio-demographic factors at a given point in time to attitudes towards delivering of online classes during lockdown. The learning design for this learning was a traverse sectional survey conducted using population based representative sample. Variables are collected for several sample units at the same points in time (one time shoot), just the data collected from the respondents directly in a particular time. Cross-sectional surveys are used to gather information (Brecht & Ogilby, 2008) on a population at a single point in time. An example of a cross-sectional survey would be a questionnaire that collects data on peoples' experiences of a particular initiative or event.

Source of Data

Primary data were collected from a community-based, cross-sectional survey. Primary data collection is the process of gathering data through surveys, interviews, or experiments. A typical aim for this study for data collection was primary data is online surveys by conducting well-done questions in India for 150 respondents. Online surveys were effective and therefore require computational logic and branching technologies for exponentially more accurate survey data collection versus any other traditional means of surveying. They are straightforward in their implementation and take a minimum time of the respondents (150). The investment required for survey data collection using online surveys is also negligible in comparison to the other methods. The results are collected in real-time for researchers to analyse and decide corrective measures.

Sampling Techniques

It is an inspecting method during which the choice of individuals for an example relies upon the possibility of comfort, individual decision or intrigue. For this examination we utilized judgment sampling. During this case, the individual taking the example has immediate or backhanded power over which things are chosen for the example.

Study Variables

The variables measured in this learning are taken based on previous studies at the global and national level. Those factors considered during this examination are delegated as: reliant and logical factors. The outcome variable is for the study attitudes towards delivering of online classes during lockdown COVID-19, which is dichotomous. The response variable for each respondent is given by:

$$Y_i = \begin{cases} 0 = \text{Negative, if attitudes towards delivering of online classes being -} \\ 1 = \text{Positive, if attitudes towards delivering of online classes being +} \end{cases}$$

The independent variables are measured from structural questionnaires. In this learning, the possible determinant factors estimated to be a significant effect on are included as variables. Poor internet connection, source of info about COVID-19, awareness on COVID-19, recommends MOOC, satisfaction with online study, materials and information sent, enough sources of materials, presently enrolled course, and favourite online methods were included for this study.

Methods of Data Analysis

In this study, frequency distribution, cross-tabulation, and percentage were applied to see the prevalence of the dependent variable. Binary logistic regression was applied to identify the factors for the outcome variable.

Binary Logistic Regression

Binary logistic regression is a prognostic model that is fitted where there is a dichotomous-/ binary-dependent variable like in this instance where the researcher is interested in whether there was positive or negative. Usually, the categories are coded as “0” and “1” as it results in a straightforward interpretation. Binary logistic regression is the sort of regression used in our study (attitudes towards delivering of online classes during lockdown COVID-19). The model is given by

$$\ln\left(\frac{\pi_i}{1-\pi_i}\right) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots \dots \beta_k X_{ki} \dots \dots \dots (1).$$

$$\frac{\pi_i}{1-\pi_i} = \exp(\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots \dots \beta_k X_{ki}) \dots \dots \dots (2).$$

where: π_i is the probability of success, $1 - \pi_i$ is the probability of failure, β_0 is the constant term, β the regression coefficients, and X_i are the independent variables. Logistic regression quantifies the relationship between the dichotomous dependent variable and the predictors using odds ratios. Odds ratio is the probability that an event will occur divided by the probability that the event will not happen. In this study, the odds ratio is the probability that attitudes towards delivering of online classes being negative divided by the probability that the attitudes towards delivering of online classes being positive. Method of maximum likelihood estimation yields to estimate values for the unknown parameters which maximize the probability of obtaining the observed set of knowledge. For logistic regression, the model coefficients are estimated by the utmost likelihood method and therefore the likelihood equations are non-linear explicit function of unknown parameters. For statistical analysis SAS version 9.4 software will be used at 5% level of significance.

Results and Discussion

Socio-economic variables are categorical. For our study the dependent variable might be “positive” or “negative.” In this case we would carry out a binary logistic regression analysis.

Table 1 depicted that poor internet connection, awareness on COVID-19, enough sources of materials; recommends MOOC, favourite online methods, and satisfaction with online study are significant in the model. The positive parameter estimates indicated that there is a positive relationship between the dependent variable and associated independent variables whereas the negative coefficients parameters indicated that there is a negative relationship between a dependent variable and independent variables. Where, X_1 is poor internet connection (No), X_2 is favourite online methods(E-books), X_3 is favourite online methods(Videos), X_4 is enough sources of materials(Yes), X_5 is satisfaction with online study (Very satisfied), X_6 is satisfaction with online study(Satisfied), X_7 is recommends MOOC (No), and X_8 is awareness on COVID-19 (No). Fitted model is given by

$$\text{logit}(\pi_i) = -.399 + .178 \times 1 + .830 \times 2 + .585 \times 3 + .339 \times 4 - .630 \times 5 - .352 \times 6 + .227 \times 7 - .303 \times 8$$

The poor internet connection (lack of internet access) had statistically significant effect to the attitudes towards delivering of online classes during lockdown COVID-19 pandemic. The odds ratio of the poor internet connection (no) equals $\exp(0.178) = 1.081$ (95% CI 1.320, 0.476) (adjusted for the other variables are constant); the results show that those students who had not good connection in the study area are 0.081 times more likely to be negative attitudes towards delivering of online classes during lockdown COVID-19 pandemic compared with that of

Table 1 Variables in the equation

Variables	Beta	S.E	Wald	Df	Sig	Exp(B)	95% CI for EXP(B)	
							Lower	Upper
Poor internet connection (ref=No)								
Yes	0.178	0.051	12.144	1	0.000*	1.195	1.081	1.320
Favourite online methods (ref= All)								
E-books	0.830	0.244	11.553	1	0.001*	2.293	1.421	3.701
Videos	0.585	0.243	5.796	1	0.016*	1.795	1.115	2.889
PPt	0.292	0.259	1.267	1	0.260	1.339	0.805	2.226
Presently enrolled course (ref=No)								
Yes	0.120	0.132	0.829	1	0.363	1.127	0.871	1.459
Enough sources of materials (ref= Yes)								
No	0.339	0.125	7.350	1	0.007*	1.404	1.099	1.794
Materials and information sent (ref=Other)								
Emails	0.553	0.358	2.391	1	0.122	1.739	0.862	3.504
Log in to icloud	− 0.061	0.144	0.178	1	0.673	0.941	0.709	1.249
University website	0.226	0.258	0.766	1	0.381	1.253	0.756	2.079
Satisfaction with online study (ref=Dissatisfied)								
Very satisfied	− 0.630	0.069	83.566	1	0.000*	0.532	0.465	0.609
Satisfied	− 0.352	0.061	33.484	1	0.000*	0.704	0.625	0.793
Recommends MOOC (ref= Yes)								
No	0.227	0.056	16.161	1	0.000*	1.254	1.123	1.401
Awareness on COVID-19 (ref= Yes)								
No	− 0.303	0.078	15.106	1	0.000*	0.739	0.634	0.861
Source of info about COVID-19 (ref=Other)								
TV/Radio	− 0.238	0.255	0.876	1	0.349	0.788	0.478	1.298
Newspaper	− 0.389	0.256	2.311	1	0.128	0.678	0.410	1.119
Magazine	− 0.373	0.274	1.850	1	0.174	0.689	0.403	1.179
Constant	− 0.399	0.476	0.702	1	0.402	0.671		

*Significant effect at 0.05

students who had good connection. Sufficient internet network for their students is a major problem setback for e-learning or online class. Without good way of connection with respect to internet, academic collaborations were not enhanced; without the use of online teaching platforms, students cannot collaborate far more than physically been in class. Such collaborations will not assist them in group research and efficient time management for academic attainments.

Awareness on COVID-19 had also statistically significant effect on delivering of online classes during lockdown COVID-19 pandemic. This implies that will help to locate out the data and information gaps among the students regarding the COVID-19 and the misconceptions and credulous beliefs popular in the society about it. It will also provide expressive data which may be useful for the concerned authority and planning institutions that prepare plans of programs to tackle the COVID-19 disease. Students who had awareness about COVID-19 pandemic odds ratio = $\exp(-0.303) = 0.739$ (95% CI 0.634, 0.861) times less likely to be negative attitudes towards delivering of online classes during lockdown COVID-19 pandemic compared students who had not awareness about COVID-19 pandemic.

Many of such platforms are readily available online; it is left for organizations to analyse the available systems and choose the best that suits their requirements considering the online methods of learning and teaching. Even though, favourite online methods had an important factor for attitudes towards delivering. The odds ratio of the favourite online methods $\exp(0.830) = 2.293$ and $\exp(0.585) = 1.795$ for e-books and videos respectively (adjusted other variables). This implies students whose favourite online methods e-books = 2.293 (95% CI 1.421, 3.701) times more likely to be negative attitudes towards delivering of online classes during lockdown COVID-19 pandemic compared all. Although students whose favourite videos, online methods of learning = 1.795 times more likely to be negative attitudes towards delivering of online classes during lockdown COVID-19 pandemic compared all. Overall, e-books and videos significantly affect than all on attitudes towards delivering of online classes during lockdown.

Conclusion

The key objective of the study is to assess the socio-demographic and related factors on the attitudes towards delivering of online classes during lockdown COVID-19 pandemic in India. Primary data were collected from a community-based, cross-sectional survey. Just the data collected from the respondents directly in a particular time. For this examination we utilized judgment sampling. We have used a sample of 150 participants. Accordingly, descriptive analysis (frequency distribution, cross-tabulation, and percentage) and binary logistic regression were used. Binary logistic regression was found to be the model that could be applied for the study to such a variable as the dependent could meet the assumptions that should be satisfied for methods to be fitted. The backward stepwise logistic regression started with a model with all the variables and excluded the variables with insignificant coefficients until the model was at its best predictive power. As a result of binary logistic regression, poor internet connection, awareness on COVID-19, enough sources of materials, recommends MOOC, favourite online methods, and satisfaction with online study are significant in the model or attitudes towards delivering of online classes during lockdown COVID-19 pandemic at 5% level of significance. The analysis of the significance of the logistic coefficients was done using likelihood ratio and Wald test. The model was considered to be valid since both the model fitting and the validation sample produced almost the same classification accuracy.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval This article does not contain any studies with human participants or animals performed by any of the authors.

References

- Adnan, M. (2018). Professional development in the transition to online teaching: the voice of entrant online instructors. *ReCALL*, 30(1), 88–111. <https://doi.org/10.1017/S0958344017000106>.

- Arbaugh, J. B., Godfrey, M. R., Johnson, M., Pollack, B. L., Niendorf, B., & Wresch, W. (2009). Research in online and blended learning in the business disciplines: key findings and possible future directions. *Internet and Higher Education*, 12, 71–87.
- Beatty, B., & Ulasewicz, C. (2006). Faculty perception on moving from blackboard to the Moodle learning management system. *Tech Trends: Linking Research and Practice to Improve Learning*, 50(4), 36–45.
- Brecht, H., & Ogilby, S. M. (2008). Enabling a comprehensive teaching strategy: video lectures. *Journal of Information Technology Education*, 7, IIP71–IIP86. Retrieved from <https://www.jite.org/documents/Vol7/JITEV7IIP071-086Brecht371.pdf>.
- Gibson, S., Harris, M., & Colaric, S. (2008). Technology acceptance in an academic context: faculty acceptance of online education. *Journal of Education for Business*, 83(6), 355–359.
- Grant, D. M., Malloy, A. D., & Murphy, M. C. (2009). A comparison of student perceptions of their computer skills and their actual abilities. *Journal of Information Technology Education*: 8, 141–160. Retrieved from <https://www.jite.org/documents/Vol8/JITEv8p141-160Grant428.pdf>.
- Kibaru, F. (2018). Supporting faculty to face challenges in design and delivery of quality courses in virtual learning environments. *Turkish Online Journal of Distance Education*, 19(4), 176–197. <https://doi.org/10.17718/tojde.471915>.
- Knight, S. A. & Halkett, G. K. B. (2010). Living systems, complexity & information systems science. *Paper presented at the Australasian Conference in Information Systems (ACIS-2010)*, Brisbane, Australia.
- Laurillard, D. (2002). *Rethinking University Teaching*. London: Routledge. <https://doi.org/10.4324/9781315012940>.
- Moore, M., & Kearsley, G. (2012). *Distance education: A systems view of online learning*. Belmont, CA: Wadsworth.
- Pfahl, D., Angkasaputra, N., Differding, C., & Ruhe, G. (2001). CORONET-Train: A methodology for web-based collaborative learning in software Organizations. In: Althoff, K.-D., Feldmann, R.L., & Müller, W. (eds.) LSO 2001. LNCS, vol. 2176, p. 37. Springer, Heidelberg.
- Rabe-Hemp, C., Woollen, S., & Humiston, G. (2009). A comparative analysis of student engagement, learning, and satisfaction in lecture hall and online learning settings. *Quarterly Review of Distance Education*, 10(2), 207–218.
- Saadé, G. R., & Kira, D. (2009). The e-motional factor of e-learning. *Journal of Asynchronous Learning Networks*, 13(4), 57–72.
- Shen, D., Laffey, J., Lin, Y. & Huang, X. (2006). Social influence for perceived usefulness and ease-of-use of course delivery systems. *Journal of Interactive Online Learning*, vol. 5, No. 3, Winter. Retrieved [May 12, 2010] from <https://www.ncol.org/jiol/issues/PDF/5.3.4.pdf>. In press.
- Shroff, R., & Vogel, D. (2009). Assessing the factors deemed to support individual student Intrinsic motivation in technology supported online and face-to-face discussions. Retrieved 7 December 2020, from <https://doi.org/10.28945/160>.
- Singh, A., Mangalaraj, G., & Taneja, A. (2010). "Bolstering teaching through online tools," *Journal of Information Systems Education: Vol. 21 : Iss. 3*, 299–312. Available at: <https://aisel.aisnet.org/jise/vol21/iss3/4>
- Smart, K.L. & Cappel, J.J. (2006). Students' perceptions of online learning: A comparative study. *Journal of Information Technology Education: Research*, 5(1), 201–219. Informing Science Institute. Retrieved December 7, 2020 from <https://www.learntechlib.org/p/111541/>.
- Unal, Z., & Unal, A. (2011). Evaluating and comparing the usability of web-based course management systems. *Journal Of Information Technology Education: Research*, 10, 019–038. <https://doi.org/10.28945/1358>.
- Wang, Y., Li, X. & Gu, R. (2004). *Web-Based Adaptive Collaborative Learning Environment Designing*. Springer-Verlag Berlin Heidelberg, LNCS 3143, 163168.
- Zhang, X., Luo, N., Jiang, D. X., Liu, H., & Zhang, W. (2004). *Web-based collaborative learning focused on the Study of Interaction and Human Communication*. Springer-Verlag, Berlin, Heidelberg, LNCS, 3143, 113–119.

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