RESEARCH ARTICLE

IMPACT OF COVID-19 PANDEMIC ON ACCESSIBILITY AND GAP IN EDUCATION QUALITY OF SECONDARY AND HIGHER SECONDARY STUDENTS: A GENERAL STUDY OF KOLKATA AND ITS SURROUNDING AREAS, WEST BENGAL, INDIA

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ARTICLE INFO	ABSTRACT
	Background: The entire world is now suffering from different crises for the COVID-19 pandemic. The education sector is one of the most tremendously affected sectors in this pandemic driven situation. India has millions of students at the school level which were affected by the shifting of the educational platform from offline to online. **Objective**: This study has attempted to analyze the accessibility status and gap in the quality of education in this pandemic situation. This study has been conducted from the perspective of secondary and higher secondary students of Kolkata and surroundings in terms of their spatial location and economic condition. **Method:** An online survey along with some restricted field survey and phone call interviews were conducted with a structured questionnaire. The random sampling method has been applied to a total of 423 students. **Result:** Study shows that there were major variations in accessibility among spatial locations of students. In terms of economic condition, it can be said that mainly very low income class and lower-income groups were having different problems in meeting basic requirements for online education thus their level of accessibility was very low in comparison to students of higher-income groups. A major portion of students mainly belonging to lower-income groups was completely detached from online education due to their economic constraints. Chi-square analysis has been also conducted to confirm the significant associations of accessibility status with spatial location and income classes. **Conclusion:** Strategies must be taken in order to fulfill the basic needs of the students to avail online education platform in terms of their location and economic condition irrespective of their vulnerable position. We have to make sure that basic education should be available to all through any platform and circumstances.

INTRODUCTION

Corona Virus Disease (COVID-19) has become the main topic of concern from its first report back in December last year in Wuhan, China (World Health Organization, 2020). Since the beginning of the COVID-19 in December it has spread rapidly over the world and the World Health Organization declared it as Pandemic on March 11, 2020. There were several restrictions in most of the countries on domestic and international travel. Sectors like offices, educational institutes went under complete shut down due to preventive measures of the virus (Owusu-Fordjoue, Koomson, 2020).

Governments, institutions, and stakeholders from several parts of the world have faced many challenges, difficulties, and constraints due to the COVID-19 pandemic (Zhang et al. 2020; Judd et al. 2020; NFER, 2020; Huber and Helm, 2020). The lockdown of school has created a major learning gap among students from different societal backgrounds (Bonal & González, 2020). As of 16th September 2020, India has reported 995933 active cases, 3942360 recovered cases, and 82066 death cases across the country (MOHFW,2020). Like the whole world, the Indian government with all states has followed different strategies to break the spreading chain of the coronavirus. As per the order of the Indian government, all sectors including all educational institutes of the country went under complete lockdown since March 22. According to the UNESCO (2020) report around 320 million learners have been affected in India. The close-down of schools has created challenges in the sense of inequalities of having access to basic needs like internet access and equipment for online teaching of children and young people

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(Assunção & Gago,2020). Students mainly from marginalized groups were facing severe problems regarding study in this pandemic (Kapasia et al. 2020). The outbreak of the COVID-19 pandemic has created a new educational platform for the learning of students across all disciplines (Kumar, 2020).In this present study an attempt has been made to highlight the accessibility condition of students for online education considering their spatial location and economic condition of their family. Overall condition of online education and satisfaction level of students also Measured.

MATERIALS AND METHODS

Subject: A questionnaire survey has been conducted based on the study of 423 secondary and higher secondary students (Under the guidance of their Guardians) from different schools of different Boards of Kolkata and surrounding parts.

Data collection: An online survey along with some field survey and phone call interviews has been conducted from 25th August to 12th September 2020 to collect much information regarding the topic. A structured questionnaire in Google form was sent to the students via WhatsApp messenger mainly and email. Some of the phone call interviews along with field surveys also conducted according to the feasibility of researchers. The observation method was applied during a conversation with the local students. Many students also responded via phone calls who did not own an android mobile phone. Some responses were also collected from some teachers who are acquainted with the researchers. A total number of 423 students provided the needed information through the questionnaire survey (both online and offline).

Data analysis: At first, a pilot survey has been done on students and some teachers to attain basic knowledge regarding the requirements of getting a proper online education. According to their responses, we have taken the most important determinant factors of online Education (Table-1) and created scores against each factor according to their weightage in accessing online education. The scores have been put following the self-rating method to measure the level of accessibility (Table-2). Collected data were subjected to statistical analysis using the Statistical Package for the Social Sciences (SPSS) IBM version 23. For analysis, descriptive and inferential statistics were used. For the descriptive analysis, mostly tables, frequency, and percentage have been used and for the inferential statistics, Cross tabulation and Chi-square-test techniques were used for analyzing any significance of the association between variables such as accessibility of online education, spatial location, and income class.

RESULT AND DISCUSSION

Respondent's characteristics: Table-3 shows the socio-demographic characteristics of the respondents. It is observed that among the 423 students' maximum students (74.2%) were above age 16 and studying in higher secondary classes (75.89%). Among the respondents females were 55.32% and men were 44.68%.Most of them were from Arts stream background (40.19%) followed byScience (31.68%) and Commerce (28.38%).

In terms of the area of residence, semi-urban (38.54%) and rural (35.22%) areas have more respondents than the urban area (26.24%). More than half of the respondents study under WBCHSE/WBBSE Board (53.42%). The monthly family income of the respondents has been categorized in a few classes for convenience in the study. The majority of the respondents (30.74%) were from lower-income (INR 5000-10000) and Very low income class (INR below 5000).

Accessibility status of the students in online education during COVID-19 pandemic: Since the initiation of lockdown in India due to COVID-19 pandemic, school, colleges, and other educational institutions have been shut down forcefully to prevent contamination among students which ultimately caused various impacts on student's academic life. Before the initiation of lockdown India's primary, secondary, and the higher secondary educational platform was solely on school-based offline mode. Students used to pursue school education at ease and collected study materials from the teachers which were almost accessible to students of all regardless of economic background and location. However, after lockdown, India's educational platform shifted to a new paradigm which is 'online education'. The main controversy regarding this new direction arose when the level of accessibility to availing basic education was at risk as this rapid shift in the paradigm of education platform took many students by surprise who barely familiar with the digital education system. In the present study, some interesting facts have come out regarding the accessibility of online education from the responses of 423 secondary and higher secondary students belonging to different spatial location and economic background of Kolkata and surrounded parts of West Bengal From the responses, it has observed that there were variations in accessibility level in terms of spatial location and income classes. Table-4 depicts that among respondents from rural areas (n=149) nearly half of them (40.3%) have no access to online classes, only 12 (8.1%) and 11 (7.4%) students have very high and high accessibility to online education. Whereas respondents from semi-urban urban areas were having better accessible conditions. In semi-urban areas (n=164) and urban areas (n=110) 29.9% and 43.6% of students were having high accessibility respectively. Among all the spatial range accessibility is quite higher in urban areas than semi-urban and rural areas. A Chi-square test has been conducted to test the initial null hypothesis and test if there is a relation between the variables such as the area of residence and accessibility. The Chi-square test shows that spatial areas have a significant relation with the accessibility of online education thus it refutes the null hypothesis. According to the person chi-square test the relationship between the area of residence and accessibility level is highly significant (Table 5). Family income has always been a determinant factor for getting basic education throughout India. During the pandemic situation as the education platform has completely changed to online mode thus family income became a more dominant factor in availing proper online education. Table-6 depicts the facts of income classes that had been created to visualize and identify problems of accessibility regarding online education. Study shows that among very low income (n=130) classes (INR below 5000 Rs) 77 (59.23%) were having no accessibility at all, only 14 students were highly accessible. On a contrary note, 38 students (66.67%) from higher-income class and 23 students (32.39%) of upper-middle-income groups were highly accessible.

Table 1. Self rating of accessibility measuring factors for online education based on pilot survey

Accessibility determinant factors	Self Rating
Proper Devices (Android Mobile, Laptop/Desktop, Tablets)	4
Proper internet connection (Mobile internet/Broadband)	3
Proper technical knowledge	2
Private study room	1

Table 2. Calculation and scaling of accessibility for online education in COVID-19 pandemic

Scaling of accessibility for online education based on self rating	
Rating Score	Level of accessibility
4+3+2+1	Very high accessibility
4+3+2	High accessibility
4+3	Moderate accessibility
4	Low accessibility
0	No accessibility

Table 3. Socio-demographic Characteristics of the Respondents (n=423)

Characteristics	Frequency (n)	Percentage (%)
Age		
below 16	109	25.77
above 16	314	74.23
Gender		
Female	234	55.32
Male	189	44.68
Class		
Secondary	102	24.11
Higher Secondary	321	75.89
Stream		
Arts	170	40.19
Science	134	31.68
Commerce	119	28.13
Area of residence		
Urban	110	26.01
Semi urban	164	38.77
Rural	149	35.22
Board		
WBBHSE/WBBSE	226	53.42
CBSE	121	28.61
ISC/ICSC	76	17.97
Income Class (INR)		
Above 30000 (High Income Class)	57	13.48
20000-30000 (upper middle class)	71	16.78
10000-20000 (lower middle class)	69	16.31
5000-10000 (lower income class)	96	30.74
Below 5000 (Very low income class)	130	22.69

Table 4. Area wise level of accessibility based on self-rating scale

Area of Residence	Very High accessibility		High accessibility		Moderate accessibility		Low accessibility		No accessibility	
	f	%	f	%	f	%	f	%	f	%
Rural Area (n=149)	12	8.1%	11	7.4%	36	24.2%	30	20.11%	60	40.3%
Semi-urban Area(n=164)	16	9.8%	49	29.9%	43	26.2%	38	23.2%	18	11.0%
Urban Area(n=110)	39	35.5%	48	43.6%	17	15.5%	4	3.6%	2	1.8%
Total(n) = 423										

Table 5. Chi-Square Test for Accessibility and Area

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	148.852	8	.000
Likelihood Ratio	157.428	8	.000
N of Valid Cases	423		

Table 6. Income wise level of accessibility based on self-rating scale

Economic condition	Very high accessibility		High accessibility		Moderate accessibility		Low accessibility		No accessibility		Total (n)
	f	%	f	%	f	%	f	%	f	%	
High income class	38	66.67%	15	26.32%	4	7.02%	0	---	0	---	57
Upper middle income class	23	32.39%	30	42.25%	17	23.94%	1	1.41%	0	---	71
Lower middle income class	1	1.45%	30	43.48%	30	43.48%	8	11.49%	0	---	69
Lower income class	3	3.13%	21	21.88%	36	37.5%	33	34.38%	3	3.13%	96
Very low income class	2	1.54%	12	9.23%	9	6.92%	30	23.08%	77	59.23%	130
											N= 423

Table 7. Chi-Square TestsChi-Square Test for Accessibility and Income

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	416.754	16	.000
Likelihood Ratio	415.211	16	.000
N of Valid Cases	423		

Table 8. Status of education during lock down period

Variables	Frequency(n)	Percentage (%)
Ability to join online classes (n=423)		
Yes	343	81.09
No	80	18.91
Status of study due to inability to join online classes duringCOVID-19 driven lockdown (n=80)		
Studying by own using exiting books	54	67.5
Study has been almost stopped	26	32.5
Attendance private tuition during lockdown(n=423)		
Yes	104	24.59
No	319	75.41
Ability to attend online classes regularly (n=343)		
Yes	157	45.77
No	186	54.23
Rate of attendance in online classes(n=343)		
above 75%	42	12.24
51-74%	62	18.08
26-50%	133	38.78
below 25%	106	30.9

Table 9. Information regarding available platforms for Online education during Lockdown

variables	Frequency(n)	Percentage (%)
Devices Used for Online Teaching(n=343)		
Android smart phones	268	78.13
Desktop computers	43	12.54
Laptops	21	6.12
Tablets	11	3.1
New Devices Purchased(n=423)		
Android smart phones	168	39.72
Desktop computers	11	2.60
Laptops	18	4.26
Tablets	8	1.89
None	218	51.54
Platforms Used for E-learning(n=343)		
Whats App	189	55.10
ZOOM Cloud Meetings	35	10.21
Google Meet	44	12.83
Google Classroom	26	7.58
Google Duo	39	11.37
Others	10	2.92

Table 10. Overall scenario of online Education during pandemic (n=343):

| opinions	Frequency(n)	Percentage (%)
Problems facing by students during Online Classes		
Network problem	252	73.47
Sharing of devices	215	62.68
Lack of concentration	194	56.56
Time management	149	43.44
Stress	152	44.31
Nothing	36	10.5
Whether students are having Proper Study Materials		
Yes	105	30.61
No	238	69.39
Syllabus covered through online classes		
<25%	131	38.19
25%–50%	102	29.73
50%-75%	86	24.19
>75%	24	6.997
Whether E-learning Is Good Enough to give you proper education		
Yes	46	13.41
No	297	86.59
Whether students are Comfortable with Online Mode of Teaching		
Yes	58	16.91
No	285	83.09
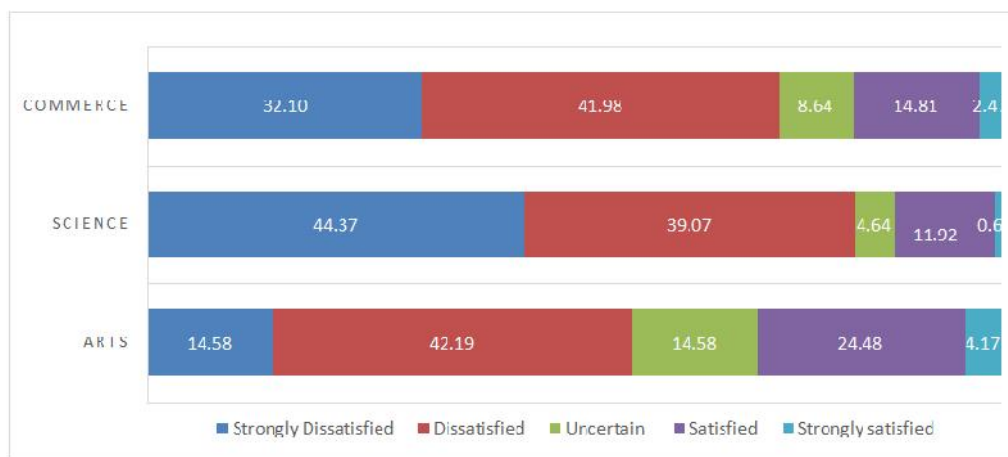
Fig 1. Stream wise satisfaction level (%) of students regarding online education

A Chi-Square test has been conducted to find whether there is any significant association between Family income and Accessibility level. Table-7 depicts that the value of significance shows a major association between these two variables which refutes the null hypothesis which depicts no association between these variables.

Changing status of Education during Lockdown: Besides the students who were unable to meet the requirements to attend online classes many students tried to cope with the new situation. Among the surveyed students (n=423) mainly 343 (81.08%) students were able to join online classes and 80 (18.91%) were completely detached from this new platform of education during this COVID-19 pandemic. Students who were not able to join online classes (n=80) 54 (67.5%) among them studied by themselves with their existing books and the other 26 (32.5%) students had to quit their education in this scenario. Students Who were attending online classes(n=343) during the lockdown period only 12.24% of students have maintained strict daily attendance in online classes and have more than 75% of attendance in online classes. Most of them have shown irregularity in attending online classes as it is observed that about 38.78%respondents have less than 50% attendance in online classes and 30.90% of students have less than 25% attendance**.** Among all students only (24.59%) attended private tuitions and (75.41%) didn't attend private tuition (Table-8). This scenario narrates how this online teaching is less effective for students and it can be said that students are not accepting this rapid change in the education system because they are not used to with this system of study.

Most of the students (78.13%) were using Android Mobile for online classes out of 343 respondents while 12.54% of students were using computer desktop and few of them are using Laptops and Tabs for online classes. Nearly half of the respondents (39.72%) have purchased Android mobile for online study purposes and only a few students (2.60%, 4.26%) have purchased Desktop and laptop respectively to meet the requirements for online education. From the study we have found that students were using various platforms to attend the online classes, like Zoom App, What's App, Google meet, and various Google Apps. The study shows us most of the students (55.10%) using WhatsApp for online studies, followed by Google meet (12.83%) and Google Duo (11.37%) to attend online classes (Table -9).

Findings related to the learning gap in Online Education and associated problems: The quality of online education during the pandemic has consistently been a point of concern. Our study found that the students who were able to join online classes have been facing several problems regarding the online mode of education. The present study depicts that nearly two-thirds of the total respondents 297 students (86.59%) claimed not to have proper online education facilities, while only 13.41% of students found the learning facilities (they have access to) proper. We have also tried to throw light on the specific problems the students have been facing regarding e-learning. The most common problem students have been facing regarding online classes was poor internet connectivity. 252 (73.47%) out of 343 respondents claimed to face major network issues. 215 (62.68%) respondents found their sharing of the device is also an issue, 195 (56.56%) students suffered concentration issues, while a section of the respondents (44.31%) suffered from stress during online classes. Access to proper study materials during the lockdown period was also a troubling factor. It has been found that 238 (69.39%) out of 343 students did not have proper study materials from online classes. In our survey, 238 (83.09%) students were not comfortable with the online mode of teaching (Table-10). Although almost all of the educational institutions have already shifted to the online mode of teaching, serious problems are making it difficult to make this shift toward success.

Findings related to the Satisfaction level of students regarding online education: Even after taking initiative in getting accustomed to the new educational platform, there are concerns of major dissatisfactions among students. From the responses of secondary and higher secondary students its rather clear that the majority of the students from different streams (Arts, Science, Commerce) and different boards (WBBSE/WBCHSE, CBSE, ICSC/ISC) were not at all satisfied with the paradigm shift in education platform. The majority of the students argued that they were not getting proper knowledge in the different subject courses from online classes. In this study, nearly 84% of students from the science stream, 74% from the commerce stream, and 56% from the arts stream have disagreed with the statement that they. Were satisfied with the overall learning system in this pandemic. Most dissatisfaction regarding online education is recorded in the case of Science students due to their inability to attend any practical classes.

The chart clearly denotes that very few students were satisfied with this system. Many students from the science and commerce stream argued that online classes were not that much effective as it happened to be in the schools.

Overall discussion

In the present study, it has found that among all students especially from rural areas many of them were unable to meet the basic requirement of owning an android phone and unable to afford that also due to the existing financial crisis due to this pandemic situation. Many students reported that online education was not a wise option for them as many of them were helping their parents in different ways to earn money to ease the difficulty of affording daily essentials in this tough time. Students who attended online classes argued that they have to share their devices with other family members for their work. On several occasions they tend to miss online classes. Some of them does own android phone but recharging internet packages on daily basis is not feasible for them. From the phone call interviews, it can be observed that most of the families in the rural areas are most concerned about feeding their families in this pandemic situation which automatically taken education in the back seat. Some of the students from lower-income groups reported that during school time they have attended classes regularly learning and evaluation process was smooth and valuable and now as they are not able to join online classes so learning process has stopped. The present study shows that poor and lower-income classes had very limited access to online mode as they were unable to cope up with the sudden change due to their lack of financial support needed for digitalization in education mode. Mostly higher and upper-middle-class were mostly able to get higher access to online education that already has access to the predetermining recruitments needed for online education and were able to bear the expenses to cope with the situation but still, they were also facing many problems. Students from different streams also argued about their inability to understand every topic in an online platform which makes them unsatisfied and worried about upcoming courses. School closed, private tuition becomes unreachable due to contamination, the academic year has changed, the syllabus has reduced, the proper evaluation process has stopped so students have to rely on online-based education which is not accessible to all so ultimately students were having wide knowledge gap.

Present and Future Prospects of online education from students perception:

For many students education in the online platform was not affordable and accessible to them as well in the present context thus they had to quit learning or rely on their own existing books. Students were not able to join private tuition also form fear of contamination, not having proper study materials so their option for learning has reduced automatically. Online education is not at all favourable to them as they are facing problems and lack of technical ability for some of them creating restrictions to them for learning; even in terms of attendance they are not able to join online classes regularly so it's breaking the learning process. Changing the syllabus, evaluation pattern, reduced course duration has an immediate impact on their future preparations for upcoming exams. Students from Science-based subjects with practical having a major impact on learning and acquiring knowledge.

For some students, this change in education platform and friendliness with technology will help us find new jobs in the coming future. Students also argued that this change will be helpful in giving education in coming pandemics or any kind of emergency crisis in the future.

Limitations: This whole survey is limited to students who were reachable to researchers considering the COVID-19 pandemic restrictions in terms of online mode and offline mode also. Thus, more students could be considered from different areas of any district, states of India. In this study, only students from secondary and higher secondary classes have been chosen. So different other classes can be chosen for future study.

Conclusion

COVID-19 pandemic has created havoc in the education sector like other sectors in India. The shifting of the learning platform from complete school-based offline to online platforms has created many problems across every discipline for millions of students in India. Accessibility of online education through spatial, economic dimension has emerged as the main question. The present study assessed the accessibility status of online education and the quality of online education in this pandemic considering mainly secondary and higher secondary students who are ready to start their higher education in the coming years. This study found that mainly in rural, semi-urban areas and among lower-income groups students are completely unable to access to the new system of education, many of them have already dropped out of school due to the economic crisis of their family. This education platform is new and in need of severe improvement thus this system fails to help in practical-based works thus creates problems regarding understanding the science-based subjects.

Many students are worried about their academic future as they think this pandemic has created a major learning gap for them. As per the overall condition, it can be said that uniformity of choices should be maintained across every section of the society when it comes to education. Concerned authorities should check whether the most vulnerable section of our society is getting available conditions for online education and should take the necessary steps. As online education has become a major part of this pandemic situation everyone related educational institutes whether students or teachers should learn about the online mode of education of better learning in the future. From the future prospect, it can be said that this new paradigm of education will become an important part of education planning considering the accessibility and quality of it.

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Shreyasi Biswas: Conceptualization, Formal analysis, Investigation, Methodology, Software, Supervision, Writing - review & editing.

Pritam Ghosh: Conceptualization, Formal analysis, Investigation, Writing - original draft, Writing - review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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