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The mental impact of digital divide due to COVID-19 pandemic induced emergency online learning at undergraduate level: Evidence from undergraduate students from Dhaka City

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ABSTRACT

Background: COVID-19 outbreak has drawn out institutions to closure with several challenges for university students of undergraduate level in Dhaka city including an emergency shift from traditional learning to online learning, which associated digital divide, left several arguments in response to technological inefficiency, pedagogic inefficiency of teachers, inappropriate study environment and so on. Previous literature shows that the COVID-19 is imposing a threat to mental health all over the nation since its spread. This study intended to evaluate the emerging reasons for psychological distress among university students of undergraduate level in Dhaka, also assess the execution methods, barriers of online learning, and lastly, the attitudes of students regarding online learning throughout the pandemic.
Methods: A mixed methodology was used to conduct the research. Primary data has been collected using simple purposive sampling on 180 undergraduate students, 9 interviews were taken including 6 in-depth interviews of different university undergraduates from Dhaka city and also 3 (KIIs) from specialists of pedagogy and medical anthropology, and a high official from Bangladesh Telecommunication Regulatory Commission (BTRC).
Results: Based on the Kessler K-10 distress scale, the study found that the prevalence of no psychological distress (16.67%) followed by mild (40%), moderate (30.56%), and severe psychological distress (12.78%).
Conclusion: The results concluded considering several reasons for mild to severe psychological distress. The findings suggest some recommendations to accumulate the process of online learning effectively and also strategies to regulate the preferred mode of learning in future.

1. Introduction

COVID-19 is a highly transmissible respiratory disease caused by a new type of human coronaviruses, the Severe Acute Respiratory Syndrome Corona Virus-2 (SARS-COV2) (Al-Tammemi et al., 2020; Sifat, 2020a). The public health crisis applies to people of all ages across the globe. For developing countries including Bangladesh, the COVID-19 pandemic is a humanitarian crisis with a public health dimension (Ahmed & Sifat, 2021). In December 2019, the virus, first detected in Wuhan, China, affected 215 nations, regions, or territories with 230,104 deaths and 3,272,202 positive cases worldwide, as of May 03, 2020 (Ferdous et al., 2020; M. S. Islam et al., 2020; World Health Organization, 2020). The World Health Organization announced it as a pandemic on March 11, 2020, and the first three cases of COVID-19 were found on March 08, 2020, in Dhaka, Bangladesh (Hossain et al., 2020; World

Health Organization, 2020a). According to the Institute of Epidemiology, Disease Control and Research (IEDCR), 49,534 confirmed cases have been registered in Bangladesh, including 10,597 (21.4%) recovered cases and 672 (1.36%) related deaths. In Dhaka city, the highest attack rate (AR) was observed (874.9/1,000,000) (Ferdous et al., 2020; World Health Organization, 2020b).

The previous studies showed that general practitioners are involved in all stages of the virus response such as assisting in the prevention of viral transmission by tracking subjects, decrease the number of cases by treating patients and providing medical surveillance, and care for patients' clinical and psychological well-being so that the whole situation can return to normal. On this premise, the general practitioners, and the majority of front-line healthcare staffs, became vulnerable to the mental effects of COVID-19 infection in response to the pandemic and its global implications (Serafini et al., 2020). Acting on the front lines with

suspected COVID-19 infection patients, general practitioners are often exposed to the virus, which can be a source of population transmission if not properly covered by sufficient personal protective equipment (PPE) (Serafini et al., 2020). Besides, the psychological responses to the COVID-19 pandemic may convert from anxiety to feelings of hopelessness and depression, which are related to negative outcomes such as suicidal behaviour (Serafini et al., 2020). Existing studies indicate that people with major affective disorders may have persistent problems in processing sensory information, which has been related to higher levels of depression, impulsivity, alexithymia, and hopelessness in response to hazardous situations (Serafini et al., 2017)

Evidence showed that the prevalence of anxiety among physicians in Bangladesh during COVID-19 outbreak was high in comparison to previous epidemics (Khatun et al., 2021), In Bangladesh, frontline fighters are anticipated to be most vulnerable to these sufferings mainly because of the crowds of peoples, shortage of personal protective equipment. Moreover, a recent report claimed patients' suicide occurrence because of treatment negligence by the healthcare professionals in Bangladesh (Ahmed & Sifat, 2021).

In this context, looking at university students' there are a number of evidence that students are experiencing awful consequences as the activities of the students and their mental health are being given less priority in this crucial situation. 99 percent of the student population from lower and lower-middle-income countries are disrupted from education due to the closure of all kinds of education institutions closures (United Nations, 2020). As educational institutions of Bangladesh have identified as direct and most immediate impact recipients of COVID-19, the government is trying to replace the usual face-to-face with online classes so that students can continue their studies. The Bangladesh University Grant Commission (UGCB) has outlined the strategy of taking online private university courses. The authority directed that the ongoing semester classes and examination activities of private universities should be carried out (Sifat, 2020a; Ferdous et al., 2020). By using many online channels, including Zoom, Moodle, Google Classroom, WhatsApp, and so on, educational institutions were pursuing the form of digitalization (Gaber et al., 2020; Rahman et al., 2020).

Due to the breakthrough of the education system caused by the coronavirus, many countries of the world are pursuing an effort to continue teaching and learning through alternative channels mostly on online basis. The key obstacles in introducing online classes for all in developing countries such as Bangladesh are the lack of sufficient internet speed, computers, mobile data cost, the financial status of the family, and the mental health of students which associated with the digital divide (Sifat, 2020a). Moreover, lack of security and no physical presence while studying increases the prevalence of psychological distress (Phutela & Dwivedi, 2020).

1.1. Threats to online learning: digital divide in bangladesh context

In the field of implementing digitalization, Bangladesh has already been associated with several arguments and challenges of online learning, digital infrastructure, digital inefficiency, which is related to the term digital divide. National Education Policy 2010 (National Education Policy 2010) discusses expanding the access of information and communicational technology (ICT) in the educational process at each level. However, the objective of the policy does not appear to be favorable at present time. The allocated TK 66,400 budget for the fiscal year 2020-2021 was distributed for the education sector. This added up to 11.7% of the total expenditure and a 2.1% portion of the GDP. Educationists opined that the rate was extremely low contrasted with Bhutan and Nepal also suggested, more allocation was required for the education sector (Abdullah, 2020). In terms of supplying electricity, the nation has about 1.5 billion population who suffers from regular interruption of electricity, for around 4-6 hours/day in rural regions, reach up to 6-8 hours during summer times. Regarding online learning, the availability of devices like a computer or mobile phone and at the same

time internet connection are the basic equipment for online education (Nitu et al., 2020). As per the information given by the Bangladesh Telecom Administrative Commission (BTRC), there were 93.7 million mobile users, 5.7 million broadband users, and few WiMAX clients in the country (Abdullah, 2020). The digital divide, which is associated with the region, financial class, gender, and so on, are the challenges to executing online learning effectively. According to Multiple Indicator Cluster Survey 2019, there is around 5.0 percent of the family units do not have a mobile phone. Again, 37.60 percent of the family units have internet access at home (metropolitan: 53.10 percent and rustic: 33.20 percent) (United Nations Children's Fund, 2019). In terms of ICT accessibility of gender, UNESCO also claims the gender divide as "one of the most significant inequalities to be amplified by the digital revolution" (Saha & Zaman, 2017). With such a high digital divide, going online for all would only widen the existing gap in learning inequality (Uddin, 2020).

1.2. Mental health condition of Bangladesh during pandemic

According to the National Mental Health Survey 2018–19, around 17% of adults of Bangladesh are associated with mental health problems, including 16.8% men and 17% women. 92.3% do not even pursue medical attention. Again, the study indicates that 6.7% have a depressive disorder, 4.5% have anxiety, 2.1% have somatic symptoms and associated conditions, while 0.9% have a sleepwalking disorder. In addition, 14% of children aged 7-17 years suffer from mental health issues (Ahmed and Sifat, 2021; World Health Organization, 2019). Bangladesh has achieved significant improvement in its health indicators such as life expectancy, total fertility rates, and child and maternal mortality, even mental health is always being a priority in health indicators (World Health Organization, 2007). A study was conducted among the private universities student, of the participants, 24% of the students experienced both anxiety and depression along with 60% of students reported episodes of anxiety, depression, and panic, and 12% of students experienced episodes of anxiety, depression, and panic. There are only episodes of anxiety and 4% do not have any psychiatric episodes. However, Pressurizing, the most commonly recorded, the mission and exam workload, and the responsibility to get a good grade were academic variables (Hoque, 2015). In a study, anxiety, and stress, prevalence estimates of depression rates were respectively, 76.1%, 71.5%, and 70.1% for at least mild symptoms, 62.9%, 63.6%, and 58.6% for at least moderate symptoms, 35.2%, 40.3%, and 37.7% for at least severe symptoms and 19.7%, 27.5% and 16.5% for at least very severe Symptoms (S. Islam et al., 2020). A survey showed that 72.6% of people of Bangladesh suffer from insomnia. In another survey found that fear of coronavirus infection, obstacles of education and future career, and financial crisis are identified as the main causes of human stress (Ahmed and Sifat, 2021; Ahmed and Sifat, 2020). Due to the closure of all educational institution, a massive number of students have addicted to the technology, for example, playing online games in mobile phone which cause regular interruption to their activities. Most of these problems cause depression and anxiety in people that harm mental health issues. All schools, colleges, and universities have remained closed since March 2020. This prolonged quarantine may impede university students' studies, disrupt their daily routines and habits, and hinder their mental health. Imposing restriction, social distancing, home quarantine is likely to have psychological distress on students and also influence their mental wellbeing (S. Islam et al., 2020).

The key objective of this analysis is to shed light on the strategy towards implementing COVID-19 pandemic-induced online emergency learning at the institutes of Dhaka city also to focus on the present scenario of university students at the undergraduate level. Effectiveness and problems faced by the attendees regarding online learning such as irregular electricity, poor internet connectivity, inappropriate study environment so on and the psychological status from the perspective of student's experience and satisfaction have been hypothesized regarding

online learning during pandemic.

2. Methodology

2.1. Research method

This research adopted a descriptive analysis of undergraduates of Dhaka city. Therefore, mixed method has been chosen in this research to seek the possible answers to the research question. As the study intended to assess the effectiveness, perception, and also the psychological distress faced during COVID-19, so both quantitative and qualitative data have been used to give a better outlook to gain an understanding of students' perception and experience and satisfaction about online learning.

2.2. Target population

Since the study intended to shed light on the strategy towards implementation mechanisms, effectiveness, problems, and the psychological status from the perspective of student's experience and satisfaction, the primary data has been collected from 180 undergraduate students currently enrolled in different universities of Dhaka city.

2.3. Sample collection

University Grants Commission (UGC) reported 147 out of the 153 public and private universities in the country are receiving support from BdREN to teach online. Study respondents were selected through the process of non-probability purposive sampling. The study was concentrated on the undergraduate students of Dhaka city.

2.4. Study area

The study area for this research was the undergraduate students, particularly from Dhaka city. Most universities of Bangladesh are situated in Dhaka city. Therefore, the findings extracted from the primary data was more appropriate to reflect the whole undergraduate student population of the country. An array of geographic locales was surveyed with respondents of private universities were from central (Baridhara, Bashundhara), Southwest (Dhanmondi) of Dhaka respectively. Further, students at public universities represent Southern, North-western and Eastern portion of Dhaka city (Azimpur, Farmgate and Mirpur) to provide a representative sample across the city.

2.5. Tools of data collection

Both primary and secondary data were collected for the research purpose. Secondary data were collected from available books, articles, research studies, and websites. Secondary data were analyzed in terms of theme, pattern and perspective. From these themes and patterns, the data were analyzed to compare and contrast the information by linking them with the relevant literature. Since the study sought the understanding of the possible answer and quantifies attitudes, effectiveness, problems, and psychological status from the perspective of student's experience and satisfaction about emergency online learning, primary data were collected using both online surveys and in-depth interviews. The tools which were followed for collecting the primary data are as follows:

2.5.1. Online forms

180 undergraduate students drawn at random from different universities and national colleges under Dhaka University situated in Dhaka City. They were recruited through social media (Facebook and WhatsApp). The questionnaire was distributed across several randomly chosen Facebook groups of university students in Dhaka and academic groups on Facebook for twelve days. Considering the COVID-19

protocol, a questionnaire was structured using Google Form, which contains a total of 28 items and divided into three sections considering the objectives of the study. The first section of the questionnaire consisted of four-closed ended items regarding various aspects of execution methods of online learning including platforms, procedures, devices, and types of Internet connection interfaces used by undergraduates of Dhaka city. Eight closed-ended items included in the second section seeking the level of satisfaction and behavior of the respondents regarding various aspects corresponding to online learning like electricity service, device compatibility, study environment at home, technical efficiency and pedagogy used by teachers, students' technological efficiency, engagement in online classes and so on were placed in five-point Likert response mode ranging strongly satisfactory to strongly dissatisfied. Further, three response categories as effective, partially effective, and not effective are offered in a separate item to find out the online learning experience of undergraduates. In the third section questions included to reveal the common barriers faced by the undergraduates, measure the level of psychological distress during distance learning, and their future preference of learning. The instrument used for this study was Kessler 10 Distress Scale (K10) (Andrews and Slade, 2001). K10 has ten questions focusing on anxiety and depression symptoms experienced during attaining an emergency online class over the pandemic period. The questionnaire asked if the respondent has felt "tired without a good reason", "hopeless", "restless", "depressed" and the responses are in the Likert scale score weights were "none of the time (1 point)", "a little of the time (2 points)", "some of the time (3 points)", "most of the time (4 points)" and "all of the time (5 points)". In terms of scoring and categorizing, respondents under 20 were considered to have no psychological distress, 20 to 24 had mild psychological distress, 25 to 29 with moderate psychological distress, and over 30 considered as having severe psychological distress(Andrews and Slade, 2001; Fassaert et al., 2009). Finally, a close-ended question to identify respondents' future preference regarding the learning approach offered three response categories including online, traditional face-to-face, and blended learning.

2.5.2. In-depth interview

An in-depth interview is a good way of collecting detailed information beyond initial and surface-level answers regarding a specific topic. These interviews were taken by the researcher and can involve multiple interviews with one participant. The researcher took six in-depth interviews over phone using non-probability purposive sampling among 180 respondents who took part in the online survey. The confidentiality of the interviewees was assured before conducting the in-depth interviews.

2.5.3. Key informant interviews (KII)

The key informants have a better understanding of the field of conducted research. This is why this technique was selected to collect the necessary information. The respondents were both specialists in education and medical anthropology respectively from reputed universities of Bangladesh and a high official from Bangladesh Telecommunication Regulatory Commission (BTRC). All the interviews are conducted with informed consent. Personal details of the interviewees were not used in the research.

2.6. Ethical Consideration

All the interviews have been carried out with informed online written consent, and the respondents were informed. All procedures performed in studies involving human participants followed the ethical standards with the 1964 Helsinki declaration and its later amendments or comparable ethical standards and also approved by Department of Development Studies Research Committee, Bangladesh University of Professionals and reviewed number: 17121020.

3. Results

Based on the objectives the results of the research are presented in three sections using tabulation and graphical presentation. Along with the result includes analyzed, verified, and transcribed in-depth interviews of the respondents and key informants are in the same section.

3.1. Execution methods of emergency online learning during COVID-19 pandemic

After analyzing data from google forms presented in Table 1 revealed that Zoom is the most frequently used platform as a medium of online learning during the COVID-19 pandemic with a 100% response rate. Zoom is followed by Google Meet and YouTube with a response rate of 58.33% and 42.78% respectively. Even though Facebook and Microsoft are one of the most famous Information Technology (IT) companies but yet they are less popular as a medium of learning with a response rate of 34.44% and 15% respectively.

In terms of execution methods of online learning, a high official from BTRC mentioned,

"We have already included a massive number of universities under the privilege of getting BdREN service, we are encouraging teachers and students constantly to pursue online platforms as a medium of education to keep up the process of learning during the ongoing pandemic."

The result presented in Table 2 and Fig. 1 showed that live class is the most used method for lecture delivery in online platforms with a response rate of 100%. Sharing Powerpoint slides (86.11% response), assignments (78.89% response), video recordings (68.89% response) and PDF Files (61.11% response) are other famous procedures of conducting online classes during the COVID-19 pandemic. Other engaging and effective modes of conducting online classes like Module, Google Forms, quiz is less used by respondents according to their rate of response. From the interview of a high official from the Bangladesh Government following statement regarding the E-learning process can be transcribed:

"Eyeing to achieve Vision-2021 the government of Bangladesh has already implemented a large number of projects relating to digital technologies. Adoption of E-Learning among students and teachers is one of the topmost priorities. The E-learning approach offers the flexibility that traditional learning never had. The approach will also help to make effective and efficient communication with world-class supervisors across the globe. Job seeking will get easier for fresh graduates by accessing the eLearning database."

Analyzing a close-ended question regarding the device used to attend online classes, Table 3 and Fig. 2 show a high percentage of respondents are relying on smartphones (93.89%) to attend online classes. Laptop (51.67%) and desktop (39.45%) users to attend online classes are quite far behind.

One of the respondents stated that:

"The configuration of my smartphone is not up to the mark to attain classes and other study-related stuff. I hardly can complete my

Table 1
Platforms used as a medium of online learning during COVID-19 pandemic

Platforms	Frequency (N)	Percentage to Total N
Zoom	180	100
Google Meet	105	58.33
Google Classroom	73	40.56
Microsoft Teams	27	15
Facebook	62	34.44
YouTube	77	42.78
Cisco Webex	11	6.11

Table 2
Procedures used to conduct online class during COVID-19 pandemic.

Procedures	Frequency (N)	Percentage to the total N
Live Class	180	100
Video Recordings	124	68.89
PDF File	110	61.11
Assignment	142	78.89
Quiz	66	36.67
Google Form	41	22.78
Module	73	40.56
Power Point	155	86.11

assignments within the deadline using this device. It is a mental pressure to handle everything online. I am worried if I am lagging from others just for the phone?"

The data presented in Table 4 and Fig. 3 reflects the current digital infrastructure scenario of the country. The large share of respondents attended online classes through broadband connectivity (46.11%). Only 20% of the respondents use mobile data and 33.89% of respondents use both types of connectivity to attend online classes.

The high official from the Bangladesh government addressed the issue stating that,

"The mobile internet service providing companies are yet to provide their internet service efficiently. The volume of spectrum used by the operators was a major reason behind the poor quality. Bangladesh Telecommunication Regulatory Commission (BTRC) gave their full attention to this problem and likely to solve it as soon as possible."

1.%2 Students' Opinions and level of Satisfaction Towards Different Aspects Related to Online Learning During COVID-19 Pandemic

Table 5 which is based on students' opinions towards different aspects of online classes, explores that majority of the students are satisfied with their electricity (18.33% strongly satisfied and 34.44% satisfied), mobile network signal, and internet connectivity (22.22% strongly satisfied and 31.67% satisfied).

The high official of BTRC stated that,

"The country is in graduation stage in achieving higher income status, so the government has emphasized sustainable electricity and energy for rapid and continued growth. While the whole Dhaka city is already under full and 90% of the country is under either full or partial uninterrupted electricity coverage and mobile network service."

However, opposite opinions can be documented regarding the compatibility of device used to attain online classes (36.67% neutral, 13.89% dissatisfied, and 8.89% strongly dissatisfied), technological efficiency (63.33% neutral, 7.78% dissatisfied, and 1.67% strongly dissatisfied) and technical support provided from respective institutions (32.78% neutral, 37.22% dissatisfied and 17.22% strongly dissatisfied). A response from an in-depth can be mentioned in this regard.

"The configuration of my smartphone is not up to the mark to attain classes and other study-related stuff. I hardly can complete my assignments within the deadline using this device. It is a mental pressure to handle everything online. I am worried if I am lagging from others just for the phone?"

One of the key informants has addressed the technological efficiency and technological support issue during his interview.

"Our government is yet to provide basic technological skills in primary, secondary, higher secondary, and tertiary levels. If the students
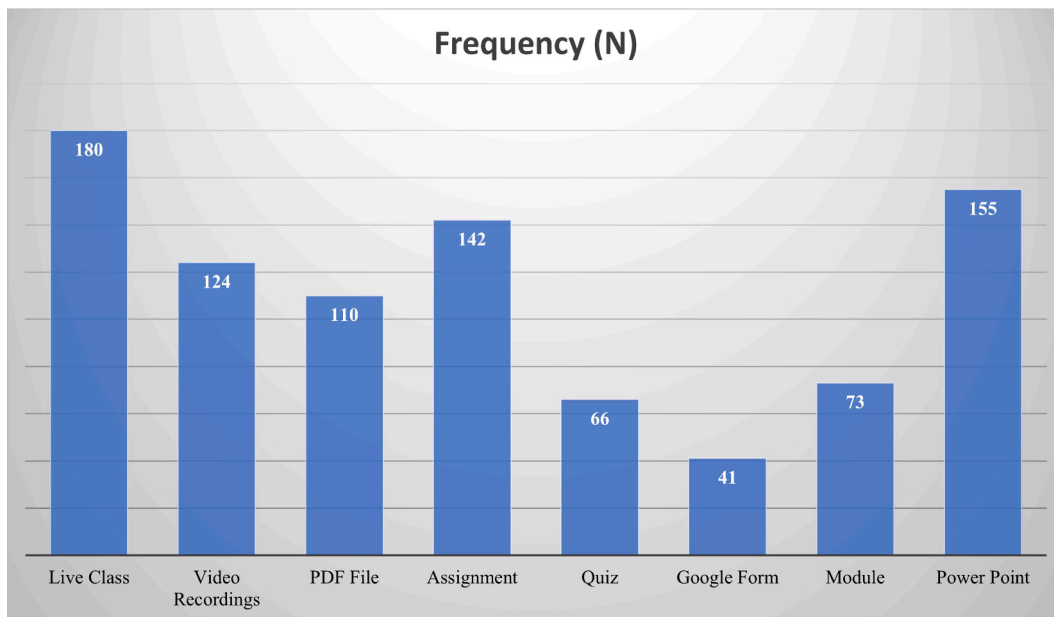
Fig. 1. Procedures Used to Conduct Online Class During COVID-19 Pandemic.

Table 3
Devices used to attend online classes during COVID-19 pandemic.

Devices	Frequency (N)	Percentage to the total N
Smart Phone	169	93.89
Laptop	93	51.67
Tablet	26	14.45
Desktop	71	39.45

were provided with technical skills during their early education, the scenario of the country might be different."

Further, a deep understanding regarding the same issue can be transcribed from the same respondent.

The allocation of budget for the education sector in terms of percentage allocated from total budget and its share in GDP is way too low. To provide elementary to advanced technical skills there are no other alternatives rather increasing the budget for the education sector."

Table 5 further reflects the negative opinions from respondents regarding engagement (28.89% neutral, 24.44% dissatisfied, and 10.00% strongly dissatisfied) and teachers' teaching method in online platforms (35.56% neutral, 16.67% dissatisfied, and 8.89% strongly dissatisfied).

3.2. Psychological status from the perspective of barriers and overall online learning experience During COVID-19 pandemic

The researchers identified few common barriers undergraduates of Dhaka city are facing while attending online classes, the result of which is presented in Table 6. Based on barriers and attitude towards online classes the result of the online learning experience is documented in Table 7. Finally, the findings related to the level of psychological distress and the mode of preference post corona pandemic period are documented in table 8 and table 9 respectively.

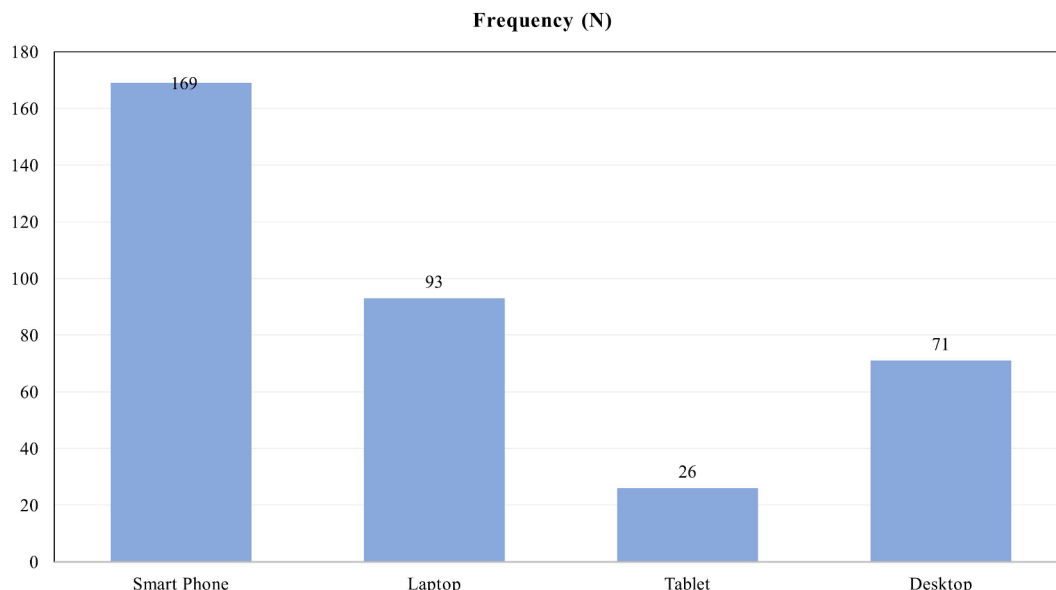The findings from Table 6 shows poor internet connectivity and

Fig. 2. Devices used to attend Online classes During COVID-19 pandemic.

Table 4

Internet connection interfaces used to attend online classes during COVID-19 pandemic.

Types of Internet Connection	Frequency (N)	Percentage to The Total N
Broadband	83	46.11
Mobile Data	36	20.00
Both	61	33.89

incompatible device are the leading barriers faced by maximum undergraduates (66.67% and 50.56%).

Poor Internet connectivity and the incompatible device are followed by irregular electricity (50.56%) and burden with assignments (43.89%). Interview from One of the respondents addressed the barriers and their effect on mental health.

> "My university continued online classes during the whole pandemic and lockdown situation. Regardless of device problems, electricity problems, internet issues I had to take part in online classes, quizzes, and even in semester finals. I felt embarrassed to ask for a better device to attain online classes. My family is already going through a deep financial crisis. Mentally I broke down when I see my grades are going down due to these issues which I do not even have any control over."

More than one-fourth of the respondents face time management (30.00%), the inappropriate environment at home (31.67%), and inefficiency in understanding online materials (20.00%) as key barriers to attend online classes during the pandemic.

However, several barriers in the overall online learning experience depict a mixed result with 42.22% of respondents thinking online learning as partially effective. Around one-fourth of the respondents

Table 6

Common barriers faced by students in online learning during COVID-19 pandemic.

Barriers in Online Learning	Frequency	Percentage to The Total N
Irregular Electricity	91	50.56
Poor Internet Connectivity	120	66.67
Time management	54	30.00
Incompatible Device	88	48.89
Inefficiency in Understanding Online materials	36	20.00
Burden With assignments	79	43.89
Inappropriate Study Environment	57	31.67

Table 7

Overall online learning experiences during the COVID-19 pandemic.

Online Learning Experiences of Respondents	Respondents	Percentage to The Total N
Effective	63	35.00
Partially Effective	76	42.22
Not Effective	41	22.78

Table 8

Level of psychological distress during COVID-19 pandemic.

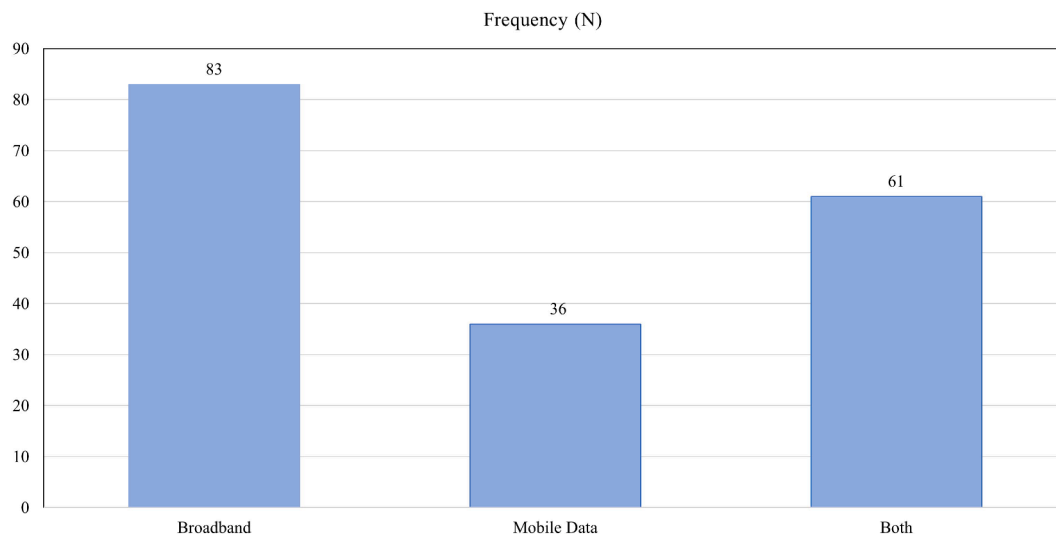| Level of Psychological Distress	Frequency (N)	Percentage to The Total N
No Psychological Distress	30	16.67
Mild Psychological Distress	72	40
Moderate Psychological Distress	55	30.56
Severe Psychological Distress	23	12.78

Fig. 3. Internet connection interfaces used to attend online classes during COVID-19 pandemic.

Table 5

Respondents opinions on various aspects related to online learning during COVID-19 pandemic

Aspects related to Online Learning	Responses (N=180) Strongly Satisfied	Satisfied	Neutral	Dissatisfied	StronglyDissatisfied
Uninterrupted Electricity	33(18.33)	62(34.44)	41(22.77)	32(17.78)	12(6.67)
Network Signal and Internet Connectivity	40(22.22)	57(31.67)	44(24.45)	30(16.67)	09(5.00)
Compatible Device	31(17.22)	42(23.33)	66(36.67)	25(13.89)	16(8.89)
Technological Efficiency	21(11.67)	28(15.56)	114(63.33)	14(7.78)	03(1.67)
Training and Technical Support from Institution	13(7.22)	26(14.44)	59(32.78)	67(37.22)	31(17.22)
Teachers' Teaching method in Online Platform	25(13.89)	45(25.00)	64(35.56)	30(16.67)	16(8.89)
Engagement in Online Learning Platform	31(17.22)	35(19.44)	52(28.89)	44(24.44)	18(10.00)
Study environment at home	33	39	42	45	21

Table 9
Mode of preference by undergraduates of Dhaka city post COVID-19 pandemic.

Mode of Preference	Frequency	Percentage to The Total N
Online	26	14.44
Traditional (Face to Face)	91	50.56
Blended	63	35

(35.00%) believe online learning is not an effective way and 22.78% were on side of online learning by addressing the process as an effective one.

Finally, concerning the attitudes, opinions, overall learning experiences and barriers towards online learning concludes with the severity of psychological distress. On exploring the level of psychological distress among university undergraduates of Dhaka city, the majority of the students portray a mild (40.00%) to moderate (30.56%) level of psychological distress.

Specialist in human psychology stated in his interview:

"Financial pressure on family Fig.head leaves undergraduates to earn their livelihood and expenses to attend online classes. However, due to high cost of internet, device and poor network quality in certain parts of the city make them psychologically feel worthless and fasten the process of dropping out."

The findings further depict the alarming scenario with the almost same number of respondents having no psychological distress (16.67%) and severe level of psychological distress (12.78%).

Finally, Table 9 demonstrates the modes of preference post corona pandemic period regarding the learning procedures of the respondents. Traditional (face-to-face) learning procedures are preferred by most of the respondents (50.56%). Traditional procedures of learning are followed by the blended method (35%) and finally, only a few respondents (14.44%) preferred the online method of learning.

To summarize the findings from respondent's response and in-depth interviews, zoom video calling application was mostly used by university undergraduate students. Smartphones are the most famous device used with broadband internet connectivity due to its cost efficiency. Further, respondents' level of satisfaction regarding online learning fluctuated due to a number of different parameters (e.i. mobile network signal, internet connectivity, compatibility of the device and teachers teaching method in online platforms). Finally, the research explored majority of the university students portray a mild to moderate level of psychological distress on the scale of Kessler K-10 measurements where respondents recommended blended method as a mode of preference to conduct classes.

4. Discussion and recommendations

4.1. Implementation procedures

The findings from the research suggest that undergraduates from Dhaka city use Zoom Video Communication as a mode of online learning to the maximum extent. Several parameters are associated with this result like cost efficiency, offered facilities, within reach of the respondents, and so on. Since the shift towards the online mode of education, there is a large patronization from the government of Bangladesh towards Zoom Video Communication software which reflects into the response rate using the software as a medium of online learning. BdREN website published a news report *titled "Online Classes using Zoom Application Software"* reported that in a meeting of higher officials on 19th March 2020 decided to collaborate with Zoom Video Application Software installed at BdREN Data Center and faculties of all universities, to take online courses to reduce students' suffering due to the massive Corona Virus pandemic (Bangladesh Research and Education Network, 2020). Though Facebook and YouTube are a less used medium of learning Kruse and Veblen (2012) revealed they can be effectively applied as an alternative learning tool. These mediums allow increasing

the intensity of uploading videos and support a participatory culture among educators and students through informal supervision (Efrizon et al., 2020). However, a counter view with empirical evidence exposed that Facebook and YouTube potentially distract students and they often end up spending more time in unproductive work online instead of focusing on their studies (Bosch, 2009).

Undergraduate students rely most on their smartphones rather than desktop and laptop. The phenomenon is common for a developing country like Bangladesh where almost one-fourth of the population (24.3 percent of the population) lives in poverty, and 12.9 percent of the population lives in extreme poverty (Chowdhury, 2020). Smartphone devices are cheaper than laptops and desktops. However, a large number of smartphones are not compatible to attend long-term interactive video classes. So, around an hour of class duration may bring the possible best outcome from the undergraduates (Rahman, 2021; Rafi et al., 2020). However, compatibility of the device is not the only issue of attending long interactive online classes. Availability of electricity and a significant amount of mobile data is also as important as the compatibility of the device to attend online classes (Rahman, 2021). However, due to financial emergencies for parents during the COVID-19 pandemic, the dropout rate is expected to reach 30 percent due to the inability to attain basic equipment (e.g. electricity, device, internet) to attend online classes (Rahman, 2021; Nitu et al., 2020).

Research findings identified that due to slow internet connection and high cost prevailed in mobile data connection Students rely more on broadband connection than mobile data connection to attend online classes. The findings were justified by Ookla's Speedtest Global Index for December 2020 by showing Bangladesh was the 135th ranked country with mobile phone users receiving an internet speed only of 10. 64Mbps. On the other hand, broadband users were recorded receiving internet speed on an average of 33 Mbps (Hasan, 2020).

4.2. Students' opinions and level of satisfaction

Kotler and Keller (2006) explained that the level of satisfaction of the beneficiaries is very much correlated with the success and effectiveness of the system. The findings of the research unveiled students' opinions and level of satisfaction towards different aspects of online learning during the pandemic. Rahman (2021) has listed strong mobile network, high-speed Internet connectivity, incessant electricity service, favorable study environment at home, basic technological skills both for students and teachers are some of the prerequisites for attending online classes.

The research found the majority of the respondents are satisfied with their electricity, mobile network, and internet connectivity. However, the result interprets that undergraduates are not satisfied with the compatibility of the device used to attend online classes, technological efficiency, and technical support from the universities. The negative response from most respondents is quite natural due to the economic status of the households and lack of technological support and training provided by the government due to closure of educational institutions and social distancing protocols to avoid transmission of coronavirus. Nitu et al.(2020) presented empirical evidence mentioning only 55.3% of students having affordability of compatible device to attend online classes and 55% of students are yet to handle the critical aspect of online learning like document creation, document to PDF file conversion, personal information security, using LMS to attend online classes and so on. Further, only 1.5% of GDP was allocated for the education sector back in 2016. The percentage rose to 2.09 in 2020, however, the amount allocation did not change drastically in the last 4 years (Uddin, 2020).

4.3. Psychological condition

Students' learning experience fluctuates due to several parameters (e.g. mental condition, physical ability, financial backup, and so on) regardless of its medium of delivery (Shenoy et al., 2020). Positive experience depends on students' satisfaction with the mode and

engagement with the learning process. Online learning provides students with the scope of freedom, variation in the learning process, and active participation in the system (Rahman, 2021). However, findings suggest undergraduate students of Dhaka city preferred traditional (face-to-face) mode of learning as a post-corona virus learning procedure. The present findings align with the observation reported by (Kapasia et al., 2020) which indicates two-thirds of undergraduate students were in favor of the offline mode of their semester examination and more than two-third in want of offline mode class before the examination. The finding put a serious mark on the success and effectiveness of online learning adopted by the government amidst the corona pandemic as Sreehari (2020) observed more than three fourth students found online classes being not engaging. Thus, the percentage of the respondents favored the blended learning approach with the integration of both face-to-face and online modes of education.

Final exploration of the research suggested that almost two-thirds of the respondents suffer from mild to moderate levels of psychological distress. The findings cemented on a previous study made by M. S. (Islam et al., 2020) . The empirical evidence showed high levels of university students were already in moderate to extremely severe depression (52.2%), anxiety (58.1%), and stress (24.9%) during pre-COVID-19 periods. The COVID-19 pandemic situation has worsened the mental health status of university graduates. Following the findings Wahed and Hassan (2017), Mayer et al. (2016), S. (Islam et al., 2020), Saeed et al. (2018), (Haq et al., 2018) documented sex, strained relationships, family and peer pressure, lack of financial support and hardship, high parental expectations, sleep deprivation, problematic internet use, longer screen time, isolation, toxic psychological environment, academic pressure, workload, and heavy test schedules are the most important factors associated to psychological distress among university graduates. Further, an inappropriate study environment also whirlwind the level of psychological distress. A report from a national daily stated Rajshahi University Mental Health Centre documented a total of 211 students found with suicidal tendencies (Alam, 2020). Boshra et al. (2020) based on seven months of observation during the pandemic stated economic factors, loneliness, depression, anxiety, problems with family members and loved ones are the most common factors associated with suicidal tendencies.

Access is the main cause of the digital divide. While this is the key contributing factor, there are other contributing factors, including infrastructure costs, lack of expertise, lack of information, and computers with poor efficiency. To ensure access in short term the government can fund educational institutions so that institutions can support students to buy electronic gadgets and internet packages. To remove student's dissatisfaction with teachers' teaching methods in online platforms government can arrange ICT training for both teachers and clusters of students to make the online learning process effective. In the long term, the government may allocate a separate budget to enhance the e-learning process. Scholarship to students and remuneration for teachers based on interactive online learning performance may help to implement e-learning effectively.

4.4. Strategy to protect mental health during pandemic

During the COVID-19 pandemic, suicide, violence, mental disorders, anxiety, depressive disorders are already increasing in Bangladesh (Sifat, 2020b; Sifat, 2020c). Fear, anxiety, sleep disturbances, depression, and suicidal thoughts are spreading among Bangladesh's population because of the COVID-19 pandemic (Ahmed and Sifat, 2021). According to the World Health Organization 2021, the most important health recommendations are integrating specialized health services like mental health services into primary health care (PHC). Regarding psychological distress, there are 50 outpatient mental health facilities, with only 4% dedicated to children and adolescents. Also, there is no specific mental health authority in the nation, and mental health services are not structured in service areas (Alam et al., 2020).

It is high time the government should take the necessary steps regarding mental health problems, such as arranging e-therapy or online counseling. The government, non-governmental organizations, charitable organizations, and youth-led projects should provide free tele-counseling and video-counseling to help individual suffering from mental distress. Online counseling should be organized along with online classes. Counseling parents and students are equally important. It is also important to encourage teachers to manage students during online courses. The authorities should develop a clear set of online classes and assessments guidelines to minimize uncertainty and resulting anxiety. Also, educational institutions could assign psychologists to mentally vulnerable students. In the long term, the government can fund universities to establish counseling centers. Further, mental health courses for university graduates can be subsidized by the government. During the COVID-19 situation, communicating with families and friends will be a primary means of coping with stress and anxiety. Another suggestion is to use a virtual meeting application like Zoom or Google Meet to connect with friends and family regularly. In collaboration with the government, the university authority should launch a mobile mental health service application for the students to receive counseling support from a professional psychiatrist or psychologist.

Universities should prepare for an increase in student requests for mental health services by allocating more resources. We encourage universities to support institutional mental health strategies with academic program-based interventions and services. We encourage administrators to collaborate with students to develop new strategies to improve student's mental health and reduce stress. Many universities have student organizations dedicated to mental health advocacy and awareness, and we encourage administrators to cooperate with students to create interventions, proactive programs and expand existing services. There is a need for widespread education campaigns across the country to increase perceptions about mental health and create change about mental health and reduce discrimination against people with mental illnesses.

4.5. Limitations of the study

This analysis had a variety of flaws that must be taken into consideration when analyzing the data. First, the sample size was relatively small, and the survey was carried out twelve days in the midst of COVID-19 surge considering health protocols and guidelines from World Health Organizations (WHO). Second, we utilized non-probability purposive sampling to recruit participants, which in turn hinders generalizing the result to the broader population. Third, google forms and mobile phone was used to conduct the survey and in-depth interviews to maintain social distancing. The form was circulated to the closed Facebook and messenger groups of university undergraduates of Dhaka city which may have led to a slightly biased sample. Further, in-depth interviews which were taken through mobile phone calls may not provide a comprehensive analysis of the situation. The interviewee may lack openness and honesty due to lack of privacy in phone calls. Finally, the data analysis process might have room to improve for better interpretations.

5. Conclusion

Coronavirus disease (COVID-19) appears with the emergence of a novel coronavirus that has not previously been detected in human beings (Al-Tammemi et al., 2020). The heavy death toll is taking place all over the world. Ensuring 'Social Distancing' is the only way to prevent the virus from being spread (Kissler et al., 2020). But in a country like Bangladesh which has a population density of 1,115.62 people per square kilometer is fallen in the pandemic risk zone (Tithila, 2020). The government has already shut down all kinds of institutions and offices except those which are serving for emergency responses. Students are encouraged to stay at home and participate in online classes. The students of Bangladesh have been struggling to carry away the digital

divide and also to get quality education, the challenge is now to go with the new mode from the traditional mode. The outcome of this analysis showed an unsatisfactory image of emergency online learning performed and also outlined the induced psychological distress overnight regarding the digital divide among undergrad level students of Dhaka city. Therefore, the study also reveals the most used procedure and tools/device for attaining the online classes and the opinions and the satisfaction level towards different aspects related to the online class. The analysis of the study also finds the prospects of distance learning among undergraduate students of Dhaka city in the future. Finally, following the recommendation part presented earlier, can suggest strategies for effective online delivery and also solve the psychological distress of students. The lesson from this study is to get mindful of the effectiveness, perception, and difficulties of online classes in order to prevent students from developing severe mental health issues. The percentage of severely distressed will be deducted if not eliminated. Protection of the mental health of students is yet to give topmost priority by the government. But it is high time to give the problem its required highlight to handle the current unforeseen situation. Future studies are encouraged to investigate the mental health service needs of the students of all the universities in Bangladesh.

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Ethics and consent to participate

All the interviews have been carried out with informed online written consent, and the respondents were informed. All procedures performed in studies involving human participants followed the ethical standards with the 1964 Helsinki declaration and its later amendments or comparable ethical standards and also approved by Department of Development Studies Research Committee, Bangladesh University of Professionals and reviewed number: 17121020.

Declaration of Competing Interest

The authors have no conflicts of interest associated with this publication.

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