Volume 21 Issue 15
Originally issued as A6



Global Journal of Management and Business Research: A Administration and Management
Volume 21 Issue 6 Version 1.0 Year 2021
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4588 & Print ISSN: 0975-5853

The Impact of COVID-19 on the Pattern of Higher Education in Bangladesh: A Study of Selected Universities to Puzzle out the Challenges

By Md. Hasan Mia
University of Dhaka

Abstract- The COVID-19 has a drastic effect on every sphere of life. The main purpose of this paper is to analyze the impact of COVID-19 on the pattern of higher education in Bangladesh. The study tried to identify the prospects and challenges, scrutinize the impact on higher education, and sort out the digital solutions to overcome the challenges of virtual transition of the higher education system in Bangladesh based on the D& M model. In this mixed research approach, the data has been collected from WHO; UNESCO; IDCR,& 152 students of both the private and public universities of Bangladesh. The study revealed the most popular online platform, student readiness and access, problem & challenges, etc.; descriptive analysis has been conducted to compare the mean; a pair simple statistics to analyses the pre and post COVID situation in case of cyber security; to correlate the independent variables to the dependent variables and test the hypothesis a pears on correlation and simple linear regression has been conducted.

Keywords: *COVID-19, pandemic, higher education, elearning, digitalization, bangladesh.*

GJMBR-A Classification: *JEL Code: I29*



Strictly as per the compliance and regulations of:



© 2021. Md. Hasan Mia. This is a research/review paper, distributed under the terms of the Creative Commons Attribution-Noncommercial 3.0 Unported License http://creativecommons.org/licenses/by-nc/3.0/), permitting all non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

The Impact of COVID-19 on the Pattern of Higher Education in Bangladesh: A Study of Selected Universities to Puzzle out the Challenges

Md. Hasan Mia

Abstract- The COVID-19 has a drastic effect on every sphere of life. The main purpose of this paper is to analyze the impact of COVID-19 on the pattern of higher education in Bangladesh. The study tried to identify the prospects and challenges, scrutinize the impact on higher education, and sort out the digital solutions to overcome the challenges of virtual transition of the higher education system in Bangladesh based on the D& M model. In this mixed research approach, the data has been collected from WHO; UNESCO; IDCR,& 152 students of both the private and public universities of Bangladesh. The study revealed the most popular online platform, student readiness and access, problem & challenges, etc.; descriptive analysis has been conducted to compare the mean; a pair simple statistics to analyses the pre and post COVID situation in case of cyber security; to correlate the independent variables to the dependent variables and test the hypothesis a pears on correlation and simple linear regression has been conducted. The study found that the COVID-19 has a tremendous impact on the pattern of higher education and digital solutions can significantly help to puzzle out the challenges impose by COVID-19.

Keywords: COVID-19, pandemic, higher education, e-learning, digitalization, bangladesh.

I. Introduction

The worldwide spreads of the Coronavirus have a tremendous impact on different sectors, including education, economic, political, and social life. All types of educational institutions, classes, and examinations remained closed and academic functions is suspended since March 17, 2020, in Bangladesh (Dutta, & Smita, 2020; Alam, 2020; Ramachandran, 2020). Still, this pandemic is on the geometric increase. COVID-19 posed challenges to Bangladesh as being an under developing country with inadequate infrastructure, funding, availing network, devices, and technical support, students' participation, hygiene, and safety measurement, training, and orientation conducting an examination, providing facilities and support, providing an atmosphere of teaching and learning ahead of all obstacles (Alamgir, 2020; Kandri, 2020; Christie, 2020). Since this pandemic seems not to be in control overnights, we must find out alternatives to mitigate the losses.

The impact of COVID-19 refers to the positive and negative consequences in social, economic, health, education, etc. The worldwide spread of the Coronavirus is a threat to development, posing physical and psychological stress, especially to students pursuing higher education (Jayasree et al., 2020; Islam, 2020; S. Anwar, 2020). Undoubtedly, the entire education system has been collapsed by COVID-19. There are 155 private and public universities, and under these universities, there are 117 medical and dental colleges, according to a recent report of the University Grants Commission (UGC) and Bangladesh Medical Dental Council (BMDC). Due to closure, students are away from the regular curriculum, depending on a single device for online classes (UGC, 2020). The study intended to explore and address the factors, barriers, and challenges to capitalize on the benefits and ensure a proper transition of our traditional education system to virtual platforms and digitalization.

a) Research Objectives

The primary objective of the study is to assess the impact of COVID-19 on the pattern of higher education in Bangladesh. The specific objectives are to explore the factors that emerged in the new normal period for the COVID-19 pandemic in the pattern of higher education; to assess the level of impact (positive, negative, or neutral) of each factor on the pattern of higher education in Bangladesh; to figure out the challenges imposed by COVID-19 in the new normal era; to address the ways to puzzle out the challenges associated with COVID-19.

II. Review of Related Literature

Researchers and academia proposed covid-19 has prolonged effects on the education system in Bangladesh, which may take several years to turn back the normal situation and start all academic activities in full swing after this new normal period (Uddin, 2020).

Author: MBA in HRM, Department of Management, University of Dhaka Dhaka-1000, Bangladesh. e-mail: hasanmgt160.du@gmail.com

© 2021 Global Journals

a) The COVID-19 & New Normal Period

The first confirmed cases for Coronavirus (nCoV-2) were addressed in Wuhan, China, on 31st December 2019, and then it out-break throughout the world overnight (Kluge, 2020; Christie, 2020). Disease-associated this virus termed Corona Virus disease 2019 (COVID-19). WHO declared it as pandemic on 11 March 2020, and Bangladesh enter this new normal life with the identification of the first patient on 8 March 2020 (WHO, 2020; S. Anwar, 2020; Chaplin, 2020; Durrani, 2020).

A recent study addressed geometrical spreads have caused millions of affected, thousands of death with a negative consequence in every sphere of life such as social, economic, production, education, physical and psychological health, etc. (Li, 2020; Schaller et al., 2015). For the term impact, we refer to positive and negative effects, barriers, radical changes, obstacles, challenges, and limitations in higher education (Khan & Khan, 2019; Mohamed et al., 2020). *Global impact survey* found that only 1% functional institution has no special measures; 10% educational institutions are open with measures to avoid COVID-19; 30% institutions partially open; 59% remain completely closed. It seems COVID-19 is undergoing in second phases and p prolong with more challenges and negative consequences (Nataliia & Anastasiia, 2020).

b) The COVID-19 & Education Downturn in Bangladesh

The first case of COVID-19 was reported on 1st December 2019 and hospital intake on 16th December of the same year at Wuhan, China (Huang et al., 2020). *Guarner et al. (2020) argued* that COVID-19 has only a 2% mortality rate compares to SARS (9.5%) & MERS (35%) pandemic. *According to a report of the World Bank (2020)*, about 150 countries declared closure and lockdown in mid-march 2020. To stop the radical outbreak, the lockdown was proclaimed to all types of activities, including closure to educational institutions across the world. Schools, colleges, and universities are kept close to reduce contact and save lives. In the first month, COVID-19 affected 370 million learners of 195 countries for hunger, nutritional deficiencies (UNESCO, 2020; Kluge, 2020; Redden, 2020). But long prevail and spread of the coronavirus and geometric increase deaths of people including the USA, UK, Brazil, Spain, Italy, India, and Bangladesh forced the policymaker to sort out the activity other than conventional way (Viscusi, 2020; Durrani, 2020). *A published report of UNESCO* found that all levels of education, teaching, learning, and training have been affected by COVID-19. More than 1.6 billion learners of 190 countries are directly affected by 40 million pre-school children at this disruption (UNESCO, 2020; Chaplin, 2020). More than 23.8 million students at pre-school to tertiary level may drop out at this prolonged pandemic. About 90% of institution faces financial & infrastructural challenges (Islam, 2020). Hence, digital platforms and online classes bridge a lifeline in students' engagement, teaching, and learning solutions but unfortunately covers less than 2% of the 2.2 trillion higher education market. From a traditional point of view, online education is viewed as ineffective and a threat to learning (Kandri, 2020).

*Another report by WHO (2020)*found that about 1.3 billion learners are not able to attend schools, colleges, and universities, whereas 63 million teachers of 165 countries are directly affected by this pandemic (Amit et al., 2020). *Expert and researcher* speculate that the influence p continues at the post-COVID-19 period in education and other sectors due to the community transmission of such pandemic (Preiser et al., 2020). To cope with such radical changes, the pattern of education is also required to reform with the help of emerging technology and resources available (Azorın, 2020). However, *Joyce et al. (2020) argued* that there are four reasons why information network and online education system necessary to enact meaningful changes right now, such as the physical appearance of classes is not feasible, self-isolation and quarantine to reduce the rate of transmission is required, necessary initiatives need to be taken to mitigate the losses in education, and to foster digitalization and technological advancement in all spheres.

c) Education Transformation &Responses of Bangladesh to COVID-19

All the countries across the world kept no stone unturned for adequate measures to prevent the spread of the coronavirus; Bangladesh is also following the same trend (Saeed et al., 2020; O'Neill et al., 2018). After confirmation first case on 8thMarch 2020, she started to take several measures such as lockdown, closure of the school, college, and universities, testing facilities, home quarantine and isolation facilities, raising awareness in all forms of media, availing amities likea mask, gloves, personal protection equipment (PPE), hand-washing, postponed the Shiekh Mujib 100th birth anniversary celebration, banned all social, cultural, political gatherings, etc. (Saeed et al., 2020). But experts speculate that the coronavirus may spread the country quite earlier.

On 15th March 2020, Bangladesh banned all international flights. In the next 55 days, about 661 people entered the country from abroad, and the Institute of Epidemiology, Disease Control and Research (ICR) claimed every passenger to prevent and p be continued until the pandemic is under control though a shortage of testing kids to control the spread (Harris, 2020; Chowdhury et al., 2020). Universities' academic activities are transforming and arranging camps, graduation ceremonies, meetings, and ancillary activities online. Different initiative have been taken to support the teacher and students. Already financial package is declared to support impoverished students until the pandemic is under control (Alamgir, 2020). The

© 2021 Global Journals

government also started online classes, take-home assignments, and examinations to tackle the loss of the academic year and overcome the session gap. Besides, financial compensation to reduce disparity and availing devices; better network; data packages; training and development to conduct and participate in online class without interruption; addressing vulnerable groups; volunteer and other infrastructure are also provided (Saeed et al., 2020; Anwar, 2020).

d) Impacts of COVID-19 on the Education System of Bangladesh

Advanced and emergent digital technology has a tremendous impact on the pattern of teaching and learning. In the last two decades, the conventional teaching approaches have transformed into online, and COVID-19 has accelerated this adaptation more (Jena, 2020; Redden, 2020; Raj et al., 2020).

Bangladesh declared lockdown on 17th March 2020, and all educational institutions remained closed. Since then, all the teaching and learning activities are conducted online using different social platforms and video conferencing platforms. Mostly used and popular online platforms are ZOOM, Microsoft platform, Google Meet, Webex Blackboard, Google classroom, WhatsApp, Facebook live stream, video conferencing, etc. to fostering E-learning (Chen, 2010; Shereen, 2020; Ramachandran, 2020; Nataliia & Anastasiia, 2020).

Though policymaker struggling to meet up losses by virtual meeting, online classes, and assessment but already there are session blockage, postponed public examination, indicating Bangladesh is not ready to tackle the challenges imposed by COVID-19 in new normal life with limited resource. The pattern of education is going through radical changes for the long-lasting of COVID-19 (Harrison, 2020). Social distancing, lockdown, online office activities, and virtual teaching and learning, etc., have been taken as preventive measures of COVID-19 in Bangladesh (Jayasree et al., 2020). This poses challenges to the densely populated and lower-middle-income country like Bangladesh in a great deal. Bangladesh is lagging for proper quarantine, sanitization, hygiene, healthcare, the supply of gloves, and prevention measures to mitigate the pandemic and minimizes losses (Islam, 2020; Anwar, 2020). In this global lockdown, the pattern of the education system is crucially rebooted, with no traditional classroom and physical appearance to ensure social distance and health and hygiene codes designed by WHO during this pandemic. Research has found that the education system of more than 160 countries has come to a standstill (Harris, 2020).

A recent study by Pravat Kumar Jena (2020) has revealed the following impact of COVID-19 on higher education worldwide such as 1. The COVID-19 destabilizes all activities in the education sector, 2. Hampered academic research & development, 3. Adversely affected the assessment system, 4. Create uncertainty and stress to graduates reducing employment opportunities so far. *According to Zimara and Linda (2020)* career, financial concern, and uncertainty generates anxiety level at 74.4%; 93.6% somatic anxiety; and 65.4% of students are suffering from high stress due to COVID-19.Post pandemic schools, colleges, and universities have two possible ways, such as starting in traditional and transforming to another pattern of education using online and digital platforms (Azorın, 2020; Hargreaves, 2020).

Table 1: Barriers & Challenges

SL	Core Barriers & Challenges	Authors
1	Lack of clarity and direction in the online class	(Uddin, 2020; Jayasree et al., 2020; Saeed et al., 2020).
2	Lack of student engagement	
3	Concentration break	
4	Lesson ambiguity	
5	Poor participations	
6	Difficulty to use the online platform	
7	Disconnection during the class	
8	Network problem, Cyber harassments & Security concern	(Joshi et al., 2020; Uddin, 2020; Islam et al., 2020)
9	Lack of motivation & concentration break	
10	Communication problem	
11	Physical injury (loss of eye-sight; back-pain; technostress)	
12	Trouble to deal and feedback to many students online	

e) Prospects & Opportunities Imposed by COVID-19

Online classroom undoubtedly provides a wide platform within shortest time, and cost, instant feedback, and student commitment but physical and traditional methods help to clear doubts enabling direct interaction with teachers and fellow students (O'Neill et al., 2014). There is no alternative other than online education in this neo-normal period to mitigate the losses in the education sector (Khan & Khan 2019).

© 2021 Global Journals

According to Saeed et al. (2020), Bangladesh lags behind adequate testing and funding. Still, there isa shortage of testing kids, and no attempt has been successful in discovering coronavirus vaccine.

A recent survey by Dr. Islam et al. (2020) found that 55% of the students do not have an internet connection to avail themselves, online classes. About 77% show negligence in participation in online classes, 45% don't have devices (Islam, 2020). Alarmingly this study found about 87% of students negatively replied on the feasibility of online classes. Where job seekers and university students are going through financial, social pressure, and psychological stress need to be addressed and adjust as COVID-19 is prolonged. Moreover, a good number of students usually go abroad for higher education, but IELTS, GRE, TOEFL, G-MATT, Visa process, etc., all remained closed due to this pandemic (Redden, 2020; Durrani, 2020). Eventually, the students already admitted to universities abroad are not allowed to fly to attend classes and are bound to attend class online. Thus, COVID-19 hinders higher education (Harrison, 2020; Inquirer, 2020; Redden, 2020).

Due to the pandemic, both the students and teachers are affected directly. But most of the study focuses on the students only. Some teachers are resisting changes and having a lack of expertise to conduct online classes in this subcontinent (Amit et al., 2020). Policymaker and educationalist think providing infrastructural facilities, coordination, funding, and financial support, and training to teachers, network, and devices to ensure 100% participation, ensuring proper accommodation, with hygiene and safety of teachers and students is a huge challenge for the developing country like Bangladesh (Uddin, 2020; Jayasree et al., 2020). This problem would be more acute if COVID-19 is prolonged to next year. Corona pandemic has posed lots of challenges in education like examination, assessment, software, internet connectivity, availing devices, etc. (Raj et al., 2020).

Table 2: Prospects & Opportunities

SL	Prospects & Opportunities	Authors
1	The vast scope of virtual training, development & certificate program	(Uddin, 2020; Jayasree et al., 2020; Islam et al., 2020)
2	Ubiquity	
3	Real-time collaboration	
4	Easy resource sharing	
5	Low cost & time saving	
6	Foster, digitalization on a virtual platform	
7	Foster distance learning	Jena et al., 2020
8	Require less manpower, infrastructure	
9	Technological literacy & expertise	Saeed et al., 2020
10	Easily connect expert from home & abroad	
11	Blended learning and virtual transformation	

f) Measures to Puzzle out Challenges by COVID-19

WHO proposed the Health, hygiene, and protection preventive measures such as social distancing (at least 3 feet), washing hands with sanitizer, avoiding touching nose, mouths, and eyes, keep informed health care provider, respiratory hygiene (using tissue, elbow while sneezing), having balanced and nutrients diet with regular check-up, etc. (Kluge, 2020; Ramachandran, 2020). Students get chances for an online course, workshop, and other learning opportunities. COVID accelerates the rate of a professional and non-professional online degree, which is estimated to grow 75 billion by 2025 (Islam, 2020). Moreover, recently University Grant Commission (UGC) undertakes a plan to sanction an interest-free loan of TK 20,000 for devices and the internet to increase the participation of students in classes at the university level (Alamgir, 2020; Majed, 2020). Networking, teacher-student collaboration, access resources, database, and communication in the online platform can lead to solving the problems raised by COVID-19 (Reimers, 2020; Chew et al., 2020).

A recent study reveals that to improve and foster the teaching and to learn there must be ensured online teaching with home assessment setting, overcoming the shortcoming of online classes, reduction of external hustle during the class, providing training to teacher to make them capable for the online class and assessment properly (Amit et al., 2020). Available online resources, e-book; online teaching and learning materials; web and mobile technologies, etc., p enhance flexibility and accessibility to education (Jena, 2020).

A study by Mohamed et al. (2020) found that the main challenges creating a bar in online education are scarcer sources; lack of ICT infrastructure; lack of expert instructor and guidance; insufficient devices for the students to attend class; the teacher and students are not used to such teaching and learning approach, etc. Educationist considers it is the right time to step towards an online platform, policy, facilities, training & online

© 2021 Global Journals

orientation, motivation, network & utilities, flexibility, assessment and evaluation, psychological and financial support, etc. can ensure students engagement and collaboration (Majed, 2020; Christie, 2020).

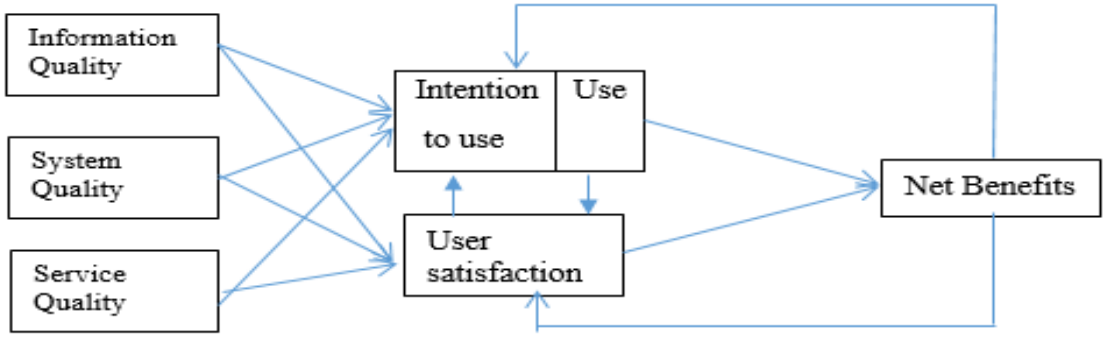
g) Models for Effective E-learning at This Pandemic

To mitigate the negative consequences of emergency in education, World Bank (2020) proposed a *Cyclic Model* including three steps, namely, prepare, cope & recover. Moreover, *World Bank (2020) suggest* several measurements as distance learning solutions such as preparedness, distance learning, educational resources, and infrastructure, etc. remote learning includes using technological solutions, inclusion distance learning tools (such as virtual, downloadable lesson, network, mobile phone, personal computer, radio and television program) using social media to engage students (i.e. Facebook, Whats App, Zoom, etc.), availability of devices, agreement with telecoms to reduce costs, data security & privacy, support for using a digital tool, self-regulation, communication, etc. (UNESCO, 2020; World Bank, 2020; Alon, 2020; Chen, 2016). Several online effective education models can be applied in the Bangladeshi perspective to mitigate the prolonged effects.

Instructional Design Model for Online Learning (IDOL), proposed by Roblyer (2015), can be helpful to ensure participation, facilitates continual learning and engagement. This is derived from the ADDIE model includes three steps, namely analysis, strategy, and evaluation (Chen, 2016; Roblyer, 2015). The teaching pedagogy model includes intelligent (using most appropriate technology), distributed (engaging all stakeholders), engaging (methods and approach for active participation), agile (flexibility and customization), and situated (relevant and pragmatic learning) (IDEAS) is found most effective in virtual teaching (UOC, 2020; Nataliia & Anastasiia, 2020).

h) Theoretical Framework

The entire study intended to assess the level of impact of COVID-19 on the pattern of higher education. Hence, De Lone & McLean IS Success Model (D & M model) p be used to introduce the most effective E-learning and address the challenges imposed by COVID-19 in higher education. This model was developed by De Lone & McLean (Arfan et al., 2020). This model includes three core levels (i.e., technical, sematic; & effectiveness) with six dimensions (i.e., quality of information; system quality; the system used; user satisfaction; organizational impact & net benefits) to foster effective communication and e-learning necessary in this new normal period (De Lone & McLean, 2016).



Source: (Arfan et al., 2020).

Figure 1: D & M Model for effective learning;

To overcome the challenges of online-based higher education, D & M model is used. For information quality, preparedness for online education from the perspective of teacher and students; reduction ambiguity and information discrepancy; collaboration; communication, and interactive learning must be ensured. As system quality, device, network; data, and bandwidth; infrastructural and technological expertise needed to ensure. They were focusing on the satisfaction of students and users with the service quality, such as data speed, the content of the lecture, evaluation methods, and assessment required to design (Mohammadi, 2015). Some researchers criticize D & M model and rewrite the dimension of' user satisfaction' with suggestions with several aspects such as an e-learning portal and user-friendly interface to assess and evaluate the students at the online platform in a new normal period (Petter et al., 2013).

i) Research Gap

To address the challenges of this pandemic and formulate strategies to overcome such challenges, it is required to properly understand such circumstances. Exploring the factors that emerged during this pandemic in higher education extends a hand to address the barriers associated with COVID-19. Assessing the degree of impact and challenges also give the edge to formulate appropriate strategies, action plan, necessary and adequate initiatives, and alternative teaching methods, etc. to overcome such challenges and minimize the long-term effects before it is too late Hence, from the perspective of Bangladesh there is no

© 2021 Global Journals

available research on the changing pattern of education due to COVID-19. This study has attempted to understand the challenges imposed by COVID-19 on higher education, radical changes in the education pattern, sort out possible ways, solutions, and alternatives for better and effective teaching and learning. Thus, this study p give a hand to the concern to set out a policy, strategy and accelerate digitalization in education. Therefore, it is expected that this study p be able to add value to puzzle out the challenges and open a diverse horizon of future research.

j) Hypotheses

H_1: COVID-19 has a significant positive impact on the pattern of higher education.

H_2: COVID-19 has a significant negative impact on the pattern of higher education.

H_3: The positive impact changes the pattern of education significantly.

H_4: The negative impact significantly changes the pattern of education.

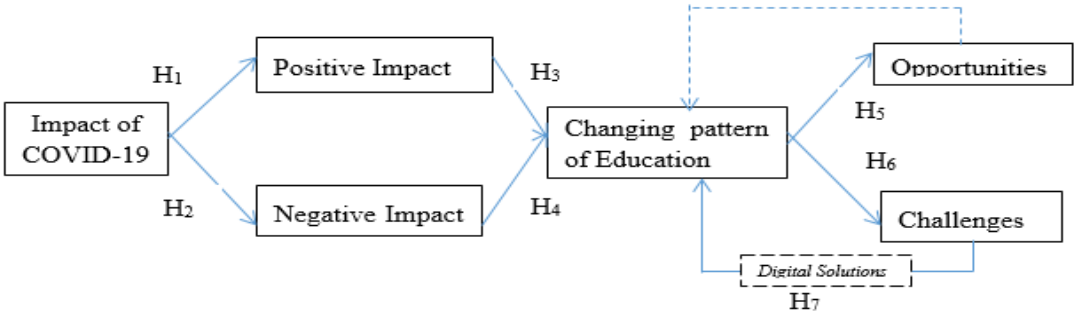
H_5: Changing pattern of education reveals opportunities

H_6: Changing pattern of education poses cyber challenges.

H_7: Digital solutions and the use of technology significantly helps to puzzle out the challenges.

k) Conceptual Framework

The entire study tried to assess the positive-negative impact of COVID-19 on the pattern of higher education in Bangladesh. Besides, it also poses some challenges and opportunities. The conceptual framework below indicates how and what the study intends to find and its connection to each endeavor.



Source: Author (2020)

Figure 2: Conceptual Framework,

It is tried to identify the positive and negative impact of COVI-19 on the education system, and thus, it is tried to explore the overall impact in Bangladesh. Moreover, the study also intended to explore what radical changes are going on, such as virtual transformation, digitalization, etc. Appropriate digital solutions, planning, strategy formulation, and implication can extend a hand to overcome such devastating circumstances and mitigate the loss in the education sector in Bangladesh

III. Methodology of the Study

This is *applied* research. The study is based on both qualitative and quantitative analysis *(mixed approach).* The result and relationship of the different variables are shown with the help of numbers and appropriate descriptions. The study also tries to find out the *causal relationship* of dependent (Changing pattern of higher education) and independent variables (positive and negative impact of COVID-19), which indicates the study as causal research. There were160,877 students of five selected universities (University of Dhaka, Jahangirnagar University, World University, Jagannath University, East-west University, BRAC University) to represent the whole students pursuing higher education at present. Some previous study to assess the impact of COVID-19 on education uses population size between 1000-2000 participants (Islam et al., 2020; Mobasser, 2010). But this study was conducted on a small scale and intended to assess the degree of impact on the pattern of higher education in Bangladesh. *A purposive* sampling method was used in this regard. The primary data p be collected by questionnaire survey using *Google form*. To serve this purpose, a sample of 50 students of representative universities p be used. Since there is no budget source for such a survey and a convenient sampling method is not possible to conduct during this quarantine period, a purposive sampling method is used (Islam et al., 2020). During this pandemic, it is quite difficult to collect data from the respondents to ensure social distance and avoid hygiene and safety. Hence, the questionnaire was designed using Google Forms. Purposive sampling was designed to collect data from the respondents who seem most capable and readily available. To represent the entire population, the most renowned five

© 2021 Global Journals

universities are selected to design a sampling frame. For the population of 160,877 students of undergraduate and postgraduate level, a sample of 156 (rounded up) was determined by using the following formula, but 152 response were collected since the rest four people did not send a reply on google form (Annual Report of UGC, 2019; Zikmund et al., 2013; Bryman, & Bell, 2003).

Here,

$$n = \frac{N}{1 + N(e^2)}$$

n = Required Sample Size
N= Total Population
e^2 = Square of the maximum allowance of error is 8% at 95% confidence level.

The sampling frame and sample size University-wise are depicted in the following table with percentage and sample size used in the survey. Most of the respondents are from Dhaka University.

Table 3: University-wise Sample Size,

Name of Universities	No. of Students	% of total Students	Sample size	
University of Dhaka	42005	26.1100	39.165	40
Jahangirnagar University	20178	12.5425	18.81375	19
Rajshahi University	38494	23.9276	35.8914	36
North-south university	22000	13.6750	20.5125	21
Brac university	11200	6.96184	10.44276	11
Jagannath University	27000	16.7830	25.1745	25
Total	=1,60,877	=100	=152	=152

Source: UGC, 2020

Respondents are asked both open-ended and Likert scale (rating highly agree=5; agree=4; neutral=3; disagree=2; highly disagree=1) questions. For collecting primary data and test the *Hypothesis,* a questionnaire containing twenty-four (24) questions was designed on a mixed approach. The first 12 questions were designed in category and ranking approach highlighting factors. In the second phase, rest 12 statements were asked on *the Likert scale*. The following variables were used in the questionnaire. The entire questionnaire covers the barriers, prospects, challenges, and impacts imposed by COVID-19, and Likert statements were formulated to assess the degree of impact on the pattern of higher education in Bangladesh. To assess the impact imposed by COVID-19, the following variables were used

Table 4: Independent & Dependent Variables

Dependent Variables	Code	Independent Variables
The Pattern of Higher Education (PE)	SR	Student Readiness
	FD	Scope for Foreign Degrees
	AH	Academic Hessel on a virtual class
	GM	Global Students mobility
	VP	Virtual Platform& Digitalization
	CT	Career Tension
	ET	Education Transformation
	PR	Participation Rate
	AE	Academic Effectiveness
	SD	Self-learning & Development
	SA	Stress Anxiety
	TS	Technical Solutions

The primary data was collected from the questionnaire survey and observation from a selected sample size of 152 students of the different universities of Bangladesh. Secondary data covered already published datasets on the various journal, books, articles, and newspapers to ensure reliable, realistic, and authentic information. The secondary data was collected from the following sources:

Quantitative data was analyzed with the help of *correlation, paired-sample T-test, and multiple regression model* using SPSS software. By correlation and regression analysis, it is tried to find out the degree to

© 2021 Global Journals

which dependent and independent variables correlate to each other and percentage independent variable can predict the dependent variables used in this study. Formula: Cohen's D= $(M_2-M_1)/SD_{Pooled}$

(Wiedermann et al., 2015). For paired samples Statistics, the following formula was used to determine Cohen's D value and standard deviation pooled value.

$$SD^{*}_{pooled} = \sqrt{\frac{(n_1-1)SD_1^2 + (n_2-1)SD_2^2}{n_1+n_2-2}}$$

Pearson correlations also showed a relationship among the independent variables of the study using following the formula-

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x^2)]\,[[n\sum y^2 - (\sum y)^2]}}$$

Here, r = correlation of co-efficient of dependent (Y= changing pattern of higher education) and independent (X= positive & negative impact of COVID-19) variables. The following formula was used for Simple Linear Regression Analysis

$$Y = A + B(x_1) + B(x2) + B(x3) + B(x4) + \ldots + B\,(xn)$$

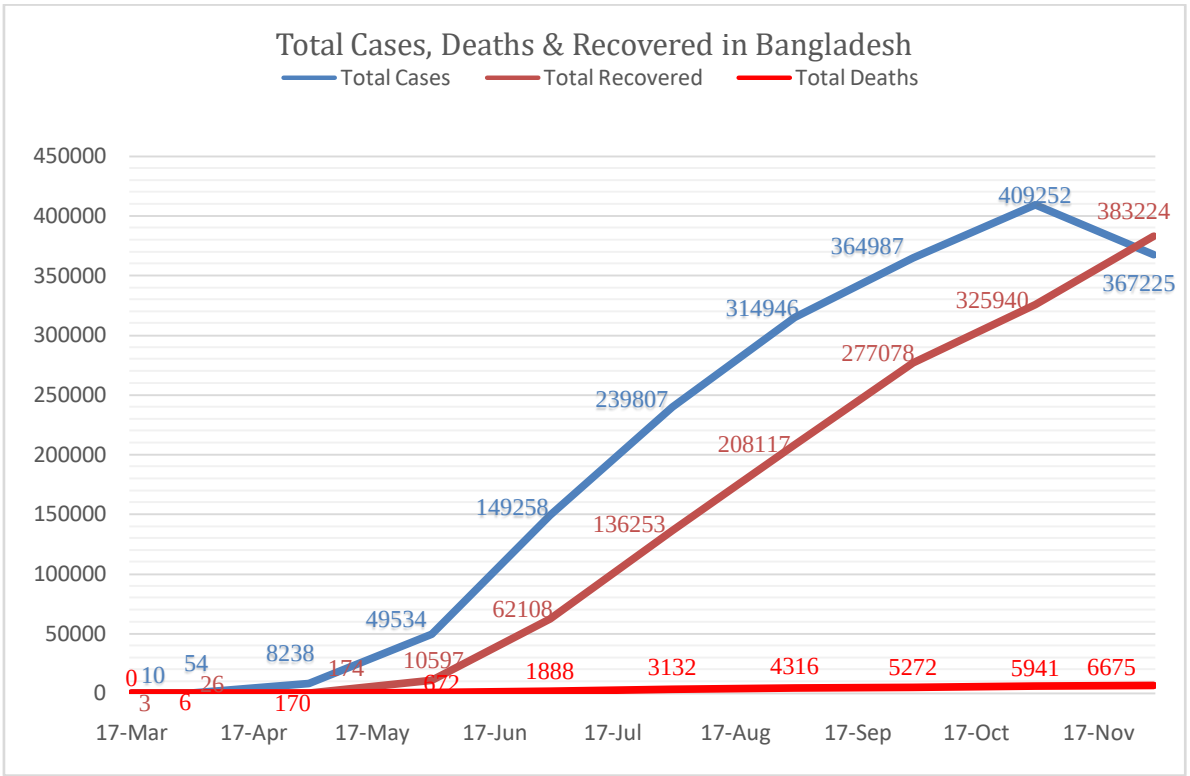
Here, *Y= Dependent variables (changing pattern of higher education)*; *A= Y intersect; B= Slope of the equation; Xn = Independent variables (positive & negative impact of COVID-19)*. The result was presented with the help of a diagram, pie chart, table, and histogram, and bar diagram. Qualitative data use is presented by an appropriate table and figure

IV. Overview of Impact & Changing Pattern of Education

The COVID-19 is increasing at a geometric and alarming rate. It is a matter of concern that within a few days and months, the number of affected and deaths is recorded. Due to the sudden outbreak and spread of the coronavirus, the entire activities of Bangladesh come to a standstill.

a) Bangladesh in New Normal Era (COVID-19)

After declaring closure on 17th March 2020, there is no sign to open the educational institutions since the geometric increment of affected and death is in progress until last December of 2020. In April, the infected, death, and the recovered number were just 54, 6, and 26, respectively. Last December 2020, the total affected was 383,224, death 6,675, and totally recovered was 409,252 respectively. This shows how severe it has spread throughout Bangladesh, with adverse impacts all over the country.



Source: WHO, 2020

Figure 3: Geometric Spread of COVID-19 in Bangladesh

© 2021 Global Journals

b) COVID-19 & Changing Pattern of Education

With the outbreak of COVID-19, all the academic activities come to a standstill in different educational institutions in Bangladesh. The private and public universities of Bangladesh are the only means to pursue higher studies and degrees. As the pandemic situation is lengthened at the end of 2020, it is decided to conduct all academic activities via an online platform. The conventional pattern of education is no more in use during this new normal period to endure social distance, hygiene, and safety issue. Hence, after June, all educational institutes started online class, assignment, examination, presentation, assessment, and evaluation using the different online platforms. Thus, the conventional pattern of the education system is going through radical changes and transforming into the virtual and online medium.

c) Virtual Platform& Academic Activities

Some of the most popular platforms mostly used and taken an active role in this transformation during this pandemic is depicted below (Dutta & Smita, 2020; Mohamed et al., 2020)-

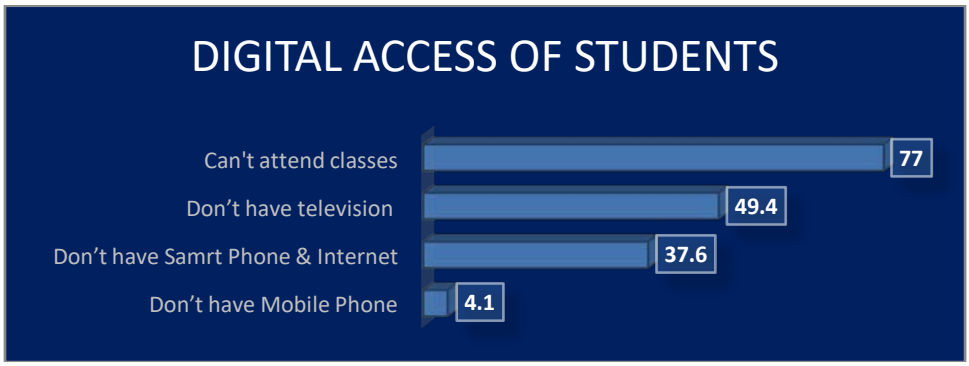
Table 6: Comparative analysis of online education platform used in Bangladesh

Platforms	Storage capacity	Participants (Free/Full)	Pricing	Exclusive features	Whiteboard
Zoom	1GB	100-500	$15-20 Month	Online chat; classroom; video recording; webinars; dropbox, etc.	Yes
Google Meet	Drive cloud	100/100	$6-25 Month	Email; chat; video & voice conferencing; docs; sheet; spreadsheet; slides; professional presentation and survey, etc.	No
Skype	30 days in Cloud	50	$5-25 Month	Individual & group audio and video call; text and file transfer; conference & classroom, etc.	No
Shikhai. live	Drive cloud	100	Free	Online chat; classroom; Video-recording; webinars; sheet; spreadsheet; slides, etc.	No
Google classroom	Drive cloud	100/100	Free	Chat; video conferencing; docs; sheet; spreadsheet; slides, etc.	Yes

The closure of educational institutions interrupted daily routine, study and life; decreased overall study time; deteriorates motivation and concentration (McCoole et al., 2020). Students cannot use the library, books, and other resources to avoid public gatherings and community transmission. Hence, students were mostly relying on virtual books such as PDF, online portal, and published educational materials. This also has negative consequences on cognitive health and student performance (Kedraka & Kaltsidis, 2020). It also disrupts social interaction, face to face contact, group studies to generate knowledge; students are wasting most of their time on social sites such as Facebook, Instagram, YouTube, WhatsApp, watching TV, playing Game, etc. (Owusu-Fordjour et al., 2020; Al-Tammemi et al., 2020). Covid-19 also provides ample opportunities other than academic curriculum on a different online platform such as Course sera, edX, and Future learn, etc., to do courses, training, and self-development programs like a seminar, discussion, etc.

d) COVID-19 & the Impact on Education

However, a significant number do not have such digital access to education due to devices, networks, and financial crisis (Das, 2020). The internet speed in Bangladesh is 9.96 (smartphone); 24.31 (broadband) (Uddin, 2020). A recent study of MICS (2019) reveals.



Source: Uddin, 2020; MICS Survey, 2019

Figure 4: Digital Access of Students

© 2021 Global Journals

COVID-19 has dramatically changed the pattern of the education system as we are familiar with creating a bar on proper completion of academic activities. Virtual education requires physical settings and affordability. It has almost become impossible for students from low earning families to pursue higher education online. Other immediate and drastic changes due to the COVID-19 outbreak is depicted below-

Irregular Attendance: A recent study of Bio TED on 2038 students found that most of them are unable to join online take part in online classes (77%). Students indicated the reason for not having devices, data bundle and broadband internet, network, financial inability, etc. this problem is acute to medicate, dental and engineering students (Islam et al., 2020).

Mental Inabilities & Physical injury: During this lockdown, students are confined indoors involving virtual class; social networking; away from social interaction and collaboration; pressure and harassment from society and family cause stress, anxiety, depression, psychological disorder, and pressure driving them to commit suicide (Ashrafur et al., 2020). Several cases have recorded social harassment, bullying, and suicide, including students from public and private universities (Mamun et al., 2020).

Networking Problem: The speed of the internet is very slow; we have only 7.2 Mbps. On the other hand, the internet package is very expensive to the students, and the network is not stable at all. Hence, most of the students get disconnected while attending the online class (Ashrafur et al., 2020).

Technical & financial crisis: Most of the students lost their part-time job and tuition due to COVID-19. Many of them used to provide financial support to their family (Islam et al., 2020). But now, they are in an uncertain condition to support themselves and undergoing a financial crisis. 43% of families are under the poverty line (Halim, 2020). The total number of students below the poverty line is 16 million (Das, 2020).

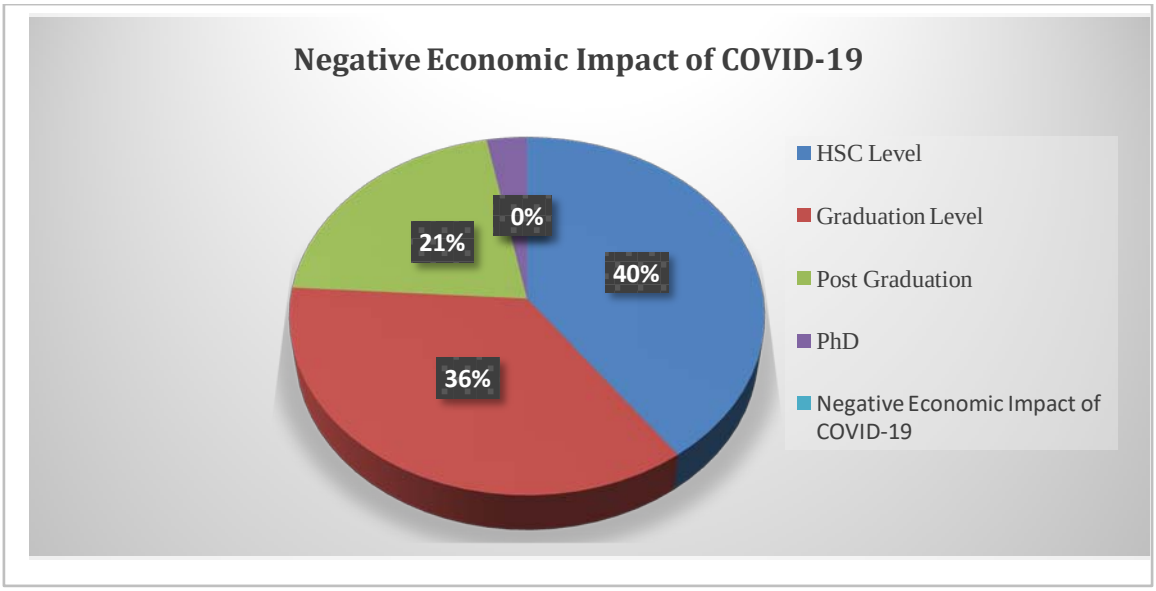


Figure 5: Negative economic impact, Source: (Das, 2020).

Accommodation problem: Many private and public universities were declared closed on 17th March 2020, and residential Halls, hostels also remain closed for an uncertain period (Ashrafur et al., 2020). Some managed to rent a house near their universities, whereas most of them settled in rural areas creating a bar to participate in an online class (Dhaka Tribune, 2020).

Social Disease Altering Academic Activities: Child marriage has increased at an alarming rate. A recent report of the Manusher Jonno Foundation (MJF) showed 462 cases of child marriage in June 2020. COVID-19 increase the level poverty and poverty-stricken family cannot afford the cost of education. As a result, child labor by 0.7% (Das, 2020). The number of students drops out is increasing before completing their graduation

V. Analysis & Findings

a) Demographic Profile of Respondents

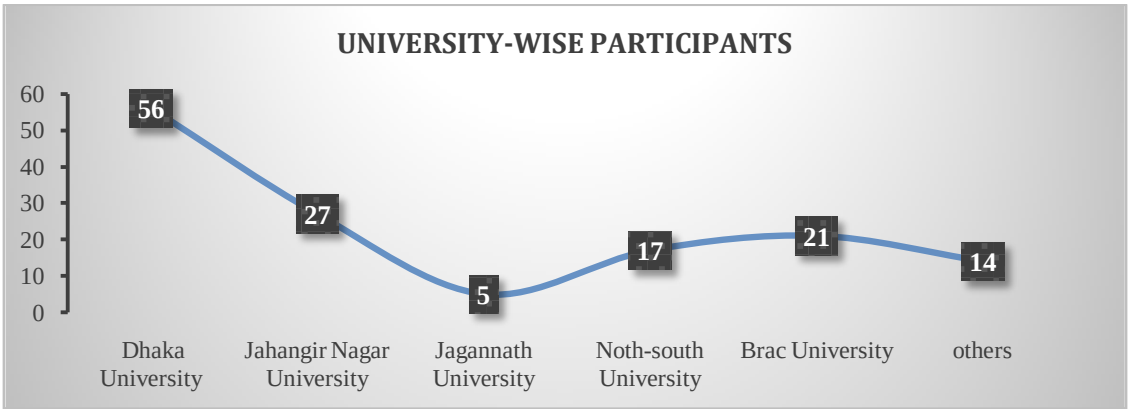
The respondents (aged 17-27 years) are the current students of undergraduate and post-graduate programs of different private and public universities in Bangladesh. They participated in different virtual academic activities online class, presentation, assessment, and evaluation, undergoing during this pandemic.

© 2021 Global Journals

Table 7: Demographic Profiles of Respondents

Profile	Category	Respondents	Percentage	
Gender	Male	87	57%	100%
	Female	65	43%	
Qualification	Honors/ Equivalent	102	67%	100%
	Masters/ Equivalent	47	31%	
	MPhil	3	2%	
Online Academic Experience	0-1 Months	14	9%	100%
	1-3 Months	46	30%	
	3-more Months	92	61%	
Age	17-22 years	25	16%	100%
	22-25 years	119	78%	
	More than 25 years	8	6%	

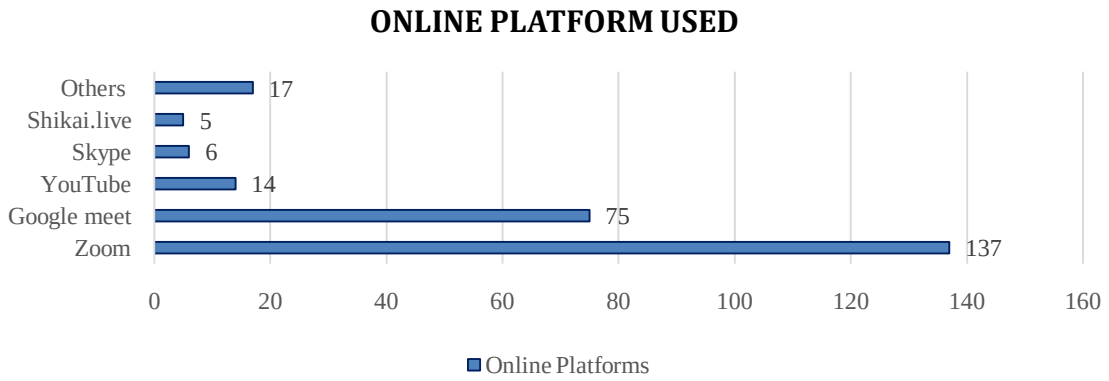
All the respondents are aged between 17- 27 years. Among them, there is 57% male, and the rest are female students with 67% students from honors level, 31% from Masters and rest are from MPhil students. Remarkably, 61% of students have more than three months of experience of academic activities using the online platform.



Source: Questionnaire survey 2020

Figure 6: University-wise respondents

Most of the students are from the University of Dhaka. Besides, the study covers participants from Jahangir Nagar University, North South University, Brac University, etc., to represent the entire students involving in higher education in this pandemic. Since conventional classroom, academic performance, and using physical infrastructure is not possible to use in this pandemic, and all transform into the online platform. To conduct academic activities online, the following online platform and social media are found most popular among the students pursuing higher education in Bangladesh in this pandemic. It is found that Zoom (90%) and google meet (49%) are mostly used the platform to all. These digital means have made academic activities easier and within reach (Owusu-Fordjour et al., 2020; Al-Tammemi et al., 2020).



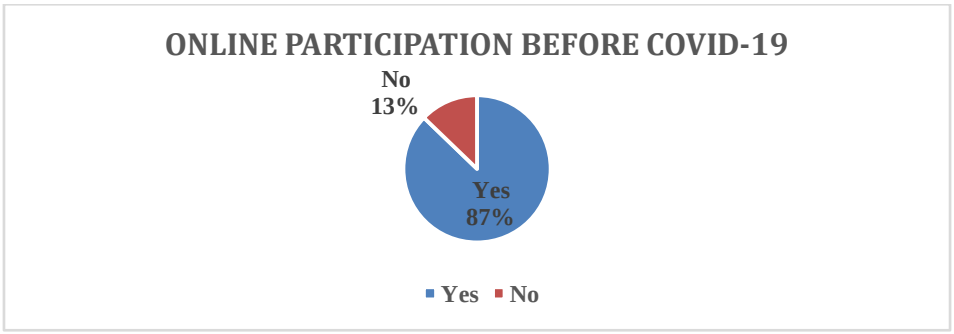
Source: Questionnaire survey 2020

Figure 7: Popular online platform

© 2021 Global Journals

b) Factors Influencing the Pattern of Education

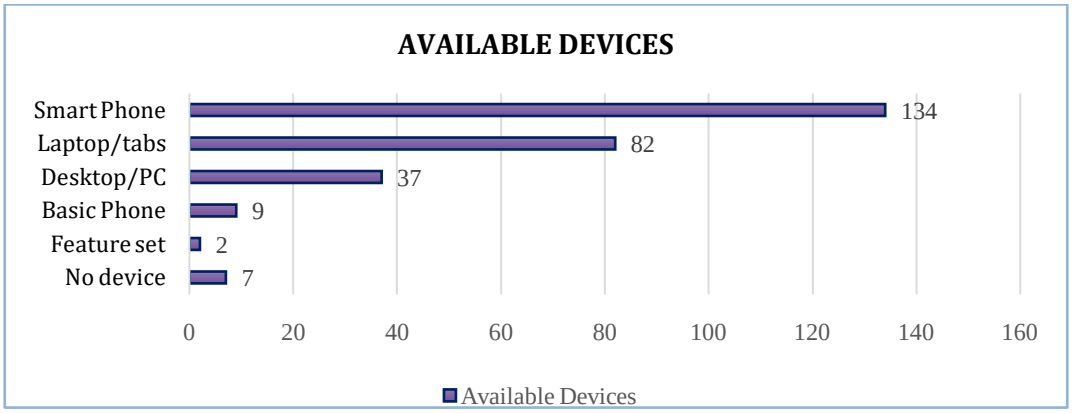
To explore the factors that emerged in the new normal period for the COVID-19 pandemic in the pattern of higher education, the following factors are found most prudent from the respondents in the questionnaire survey. Prior experience of online class before quarantine: The study reveals that most of the students have prior experience of online academic activities before this pandemic. They used to take part in a conventional classroom, learning materials, teaching methods, and evaluation. However, virtual participations require no such instruments rather, and all are readily available at online sharing platforms (Google Drive, Gmail, zoom, google classroom, etc.) (Nataliia & Anastasiia, 2020).



Source- Uddin, 2020.

Figure 8: Types of devices students have

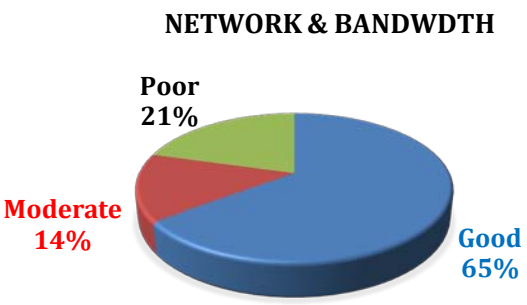
Student Readiness: To assess the readiness of students on online academic activities, the following digital devices are available proportionately to each of them. Alarming findings is that in this digitalization, some students are still not availing smart phone, laptops/ PC to take part in online academic activities.



Source: Questionnaire survey 2020

Figure 9: Available Devices

Poor Internet Bandwidth/Network: Most of the students can't attend class and gets disconnected during the class due to network problem and poor bandwidth. The survey data reveals, 21% of students are suffering from poor internet bandwidth and network, which hampers their academic involvement and activities drastically.

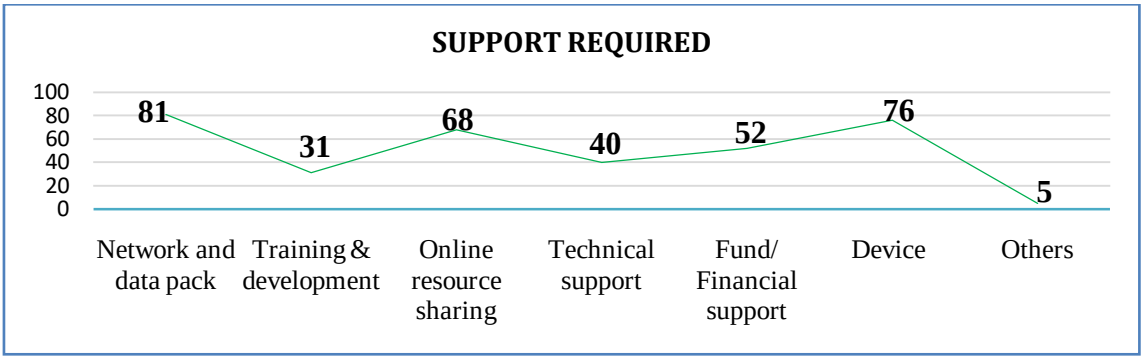


Source: Questionnaire survey 2020

Figure 10: Network & Bandwidth

© 2021 Global Journals

Inadequate Technical, Infrastructural & Financial Support: The following figures indicate the nature of support students need for online smooth academic activities (Joshi et al., 2020). Unfortunately, Bangladesh does not have adequate infrastructure and information technology to tackle such challenges of the COVID-19 pandemic and run academic activities up to the mark. Hence, most of the students are from a middle-class families and can not afford basic requirements and devices to participate in online classes. Among the financial and infrastructural problems, the network and bandwidth, devices and other resources, and technical support are found most acute necessary for most of the students who cannot afford them immediately.



Source: Questionnaire survey 2020

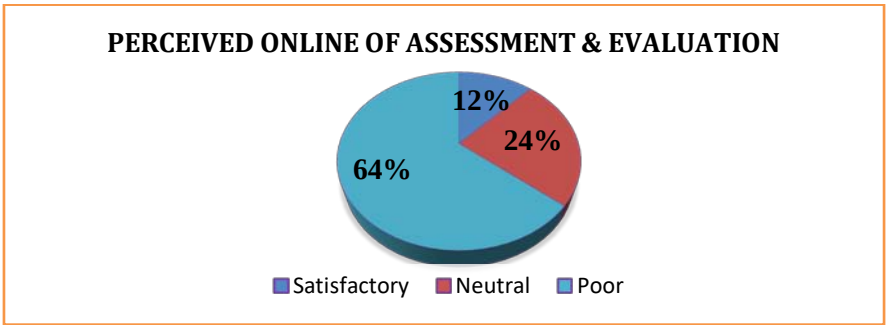
Figure 11: Required Support

During this pandemic, different universities raise funds to support the students so that they can participate in academic activities online. The following list includes the support that students get from their institutions, government, and other organization for smooth educational activities. The table shows a very small amount of students who need support get the support. Without ensuring such arrangement and assistance, not all students can be involved to serve the purpose.

Table 8: Students Support Provided for Online Academic Activities

Available Support	Response	Percentage	Scenario
Fund/ Financial Support	52	14.6479	Poor
Device & Network	76	21.4085	Moderate
Technical Support	40	11.2676	Poor
Training & Development	31	08.7324	Poor
Resource Sharing (Virtual books, library)	68	19.1549	Moderate
Network & Data-pack	81	22.8169	Moderate
Others	7	01.9718	Poor
Total	355		

Student Assessment & Evaluation: To assess and evaluate the students, the online platform is found not so effective compared to the traditional classroom. It lacks direct contact and interaction with the teachers and assessors. Hence, some students may feel difficulties submitting their exam scripts, buffering due to network problems, lack of expertise often make prey to negative evaluation and marking during the assessment and evaluation of the students. The survey also found that it is ineffective and prone to biases. Some students consider it as pure commercialization of education and available to those who can afford it (Joshi et al., 2020; Amit et al., 2020).



Source: Questionnaire survey 2020

Figure 12: Assessment & Evaluation

© 2021 Global Journals

Prospects in higher education due to COVID-19 Vast scope of virtual training, development & certificate program; Ubiquity; Real-time; collaboration; Easy resource sharing; Low cost & time saving; Foster digitalization on the virtual platform; Foster distance learning; Require less manpower; Technological literacy & expertise; Easily connect expert from home & abroad using the virtual platform; Blended learning and virtual transformation (Uddin, 2020; Jayasree et al., 2020; Islam et al., 2020).

c) *The Impact on the Pattern of Higher Education*

To assess the level of impact (positive, negative, or neutral) of each factor on the pattern of higher education in Bangladesh.

i. *Academic Barriers*

To assess the barriers and problems associated with online class, the descriptive analysis of the response of participants is showed in the following table (Joshi et al., 2020; Kapasia et al., 2020; Uddin, 2020; Jayasree et al., 2020).

Table 9: Academic Barriers Associated with COVID-19

Descriptive Statistics					
Academic Barriers	N	Mean		Std. Deviation	Variance
	Statistic	Statistic	Std. Error	Statistic	Statistic
Lack of clarity and direction	152	4.09	.098	1.212	1.469
Difficulty to use the online platform	152	4.08	.060	.742	.550
Lack of student engagement	152	3.93	.093	1.146	1.313
Concentration break	152	3.92	.068	.834	.696
Don't understand the lesson	152	3.93	.059	.725	.525
Poor participations	152	3.83	.096	1.178	1.388
Disconnection during the class	152	4.47	.075	.920	.847
Network problem	152	3.68	.086	1.064	1.131
Lack of motivation & concentration break	152	3.76	.092	1.133	1.285
Communication problem	152	4.30	.037	.461	.212
Lack of expertise	152	4.30	.075	.921	.848
Physical injury & amp; Techno stress	152	3.68	.093	1.148	1.317
Trouble to deal and feedback	152	3.91	.068	.833	.693
Valid N (List-wise)	152				

Source: Survey Data 2020

Hence, the response is evaluated on a scale of highly disagree (1); Disagree (2); Neutral (3); Agree (4), and Highly Agree (5). It is found that all the responses concentrated on a statistic mean of 3.83-4.30. Therefore, it can be decided that respondents agreed to most of the barriers and problems (negative impact) in the above table imposes by COVID-19, which hampered the academic activities, and we can reject H_1 and accept H_2.This refers to the positive impact is not up to the mark, and there is an adverse negative impact in higher education due to COVID-19.

ii. *Cyber Harassments & Security Concern*

To identify the level of impact comparing prior COVID-19 and post COVID-19 situation, paired-samples statistics are conducted in the following table. Hence, the perceived cyber security hack was 36.8%. With the outbreak of COVID-19, different online academic activities have been introduced, and this threat has increased by 12%. The degree of increase according to Cohen's D value is 7.1%. (Joshi et al., 2020; Alon, 2020).

Table 10: Perceived Cyber Security (Paired Samples Statistics)

Category	Mean		Standard Deviation		Paired Difference		Sig. 2 Tailed	Cohen's D
	Start-up	Current	Start-up	Current	Mean	Standard Deviation		
Hack	0.368	0.48	0.484	0.501	0.112	0.243	0.48	0.071
Data Privacy	0.39	0.49	0.489	0.530	0.10	0.260	0.633	0.158
Information Misuse	0.38	0.47	0.391	0.460	0.09	0.182	0.12	0.379
Unauthorized Access	0.39	0.53	0.424	0.521	0.14	0.225	0.08	0.431
Bullying & Harassment	0.34	0.46	0.473	0.542	0.12	0.259	0.43	0.267

Similarly, Cohen's D value for data privacy (15.8%), information misuse (37.9%); unauthorized access (43.1%); bullying and harassment (26.7%) has increased significantly. This indicates that the transition education system to a virtual platform such as ZOOM, Google Meet, Skype, and other platforms poses a great

© 2021 Global Journals

cybersecurity threat in comparison to traditional classroom and academic activities. Therefore, the conclusion can be drawn that COVID-19 poses significant challenges in the case of cybersecurity, and thus, the H_6 can be accepted.

d) *Assessing Degree of Impact*

i. *Correlation Analysis*

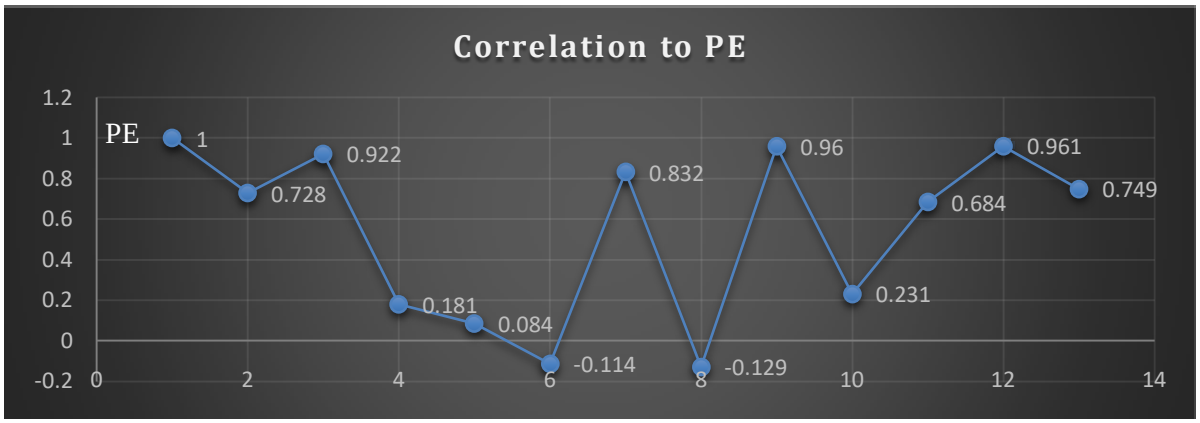
From the above variables, the correlation and linear regression model analysis was conducted. Hence, in the correlation, the pattern of education (PE) is found highly correlated to Student readiness (SR, 72.8%); Foreign degrees (FD, 92.2%); Career tension (CT, 83.2%); participation rate at online class (PR, 96%); self-learning and development (SD, 68.4%); perceived stress and anxiety (SA, 96.1%); and technical solutions (TS, 74.9%).

Table 12: Correlation Analysis

	PE	SR	FD	AH	GH	VP	CT	ET	PR	AE	SD	SA	TE
PE	1												
SR	.728**	1											
FD	.922*	.714**	1										
AH	.181	.156	.145	1									
GM	.084	.053	-.031	.609	1								
VP	-.114	-.083	-.070	.717	.721	1							
CT	.832	.602**	.746**	.149	.114	-.072	1						
ET	-.129	-.059	-.083	.747	.773**	.915**	-.125	1					
PR	.960**	.725	.882**	.171	-.086	-.101	.855	-.118	1				
AE	.231	.132	.239	.012	-.380	.114	.174	-.096	.171	1			
SD	.684**	.514	.670	.093	-.101	-.152	.559*	-.151	.655**	.108	1		
SA	.961**	.748*	.884**	.168	-.092	-.154	.797*	-.105	.922	.248	.652**	1	
TS	.749	.956**	.709	.158	.019**	-.097	.621**	-.086	.719	.158	.509	.769	1

**Correlation is significant at the 0.01 level (2-Tailed)*
***Correlation is significant at the 0.05 level (2-Tailed)*

On the other hand, academic hassle (AH, 18.1%); academic effectiveness (AE, 23.1%) is found a low correlation to the pattern of Education (PE) in this pandemic and virtual transition of education. Other variables such as education transition (ET) and virtual platform (VP) are found negatively correlated to the pattern of education. Hence, we can conclude that most of the above variables have a positive correlation to PE.



Source: Survey, 2020

Figure 13: Correlation of independent variables to dependent variables (PE)

ii. Regression Analysis

The regression model assesses the level of impact due to COVID-19 on the pattern of higher education in Bangladesh. The following regression predicts how much the independent variables can predict the dependent variables in this estimation. The value of adjusted $R^2$is 87.5%, which refers to the selected independent variables such as academic hassle, digital transformation; global student mobility; participation rate; readiness of students; the effectiveness of assessment and evaluation online; self-learning and development; career tension; stress;

© 2021 Global Journals

anxiety; technostress; etc. can predict 87.5% of how much the pattern of education has been changed in this sudden outbreak of COVID-19 pandemic.

Table 13: Result of Multiple Linear Regression Analysis

Model Summary						
Model	R	R Square	Adjusted R^2	Std. The error of the Estimate	Change Statistics	
					F Change	Sig. of F Change [b]
1	.936[a]	.877	.875	.102	489.284	.000

a. Dependent Variable: Pattern of Education &Predictors: (Constant), Technical Solutions, Global Students mobility, Academic Effectiveness, Self-learning & Development, Academic Hessel, Career Tension, Virtual platform, Foreign degrees, Stress and anxiety, Education transformation, Participation Rate, Student Readiness

Besides, the significant level is 0.00<.05 indicates the acceptability of the regression of prediction. The R^2indicates the variation of dependent variables (PE) due to the changes of independent variables. Therefore, we can conclude that the COVID-19 has a tremendous and disastrous impact and changes the pattern of higher education to a transition in a take-home manner via virtual platforms digital technology.

Moreover, the coefficients table of the regression model refers to the contribution of each variable to the dependent variable (PE). The Y intersect -.039. The model indicates that each alteration of student readiness p adds a value (-.039) to the education pattern. Based on the beta value of the coefficient regression model, the following regression equation can be formulated:

$$Y= -.039-.123x_1+ .186x_2+ .049x_3+ .028x_4+.141x_5-.004x_6-.212x_7+.364x_8+.007x_9+.024x_{10}+.451x_{11}+.101x_{12}$$

Here, Y= Changing Pattern of Education; A= Constant (Y intersect of the linear equation); X_1+X_2+……Xn= Independent variables of the study

Table 14: Coefficients of Regression Model

Model		Unstandardized Coefficients		Standardized Coefficients	t	Unstandardized Coefficients	Impact
		B	Std. Error	Beta		Sig. (*P*)	
1	(Constant)	-.039	.106		-.365	.716	
	Student Readiness	-.123	.039	-.149	-3.113	.002	Significant
	Foreign Degrees	.186	.032	.188	5.805	.000	Significant
	Academic Hessel	.049	.020	.055	2.479	.014	Significant
	Global Students mobility	.028	.019	.032	1.506	.134	Insignificant
	Virtual Platform	.141	.038	.142	3.730	.000	Significant
	Career Tension	-.004	.024	-.004	-.154	.878	Insignificant
	Education Transformation	-.212	.042	-.212	-5.062	.000	Significant
	Participation Rate	.364	.045	.359	8.067	.000	Significant
	Academic Effectiveness	.007	.013	.007	.507	.613	Insignificant
	Self-learning & Development	.024	.015	.028	1.579	.117	Insignificant
	Stress & Anxiety	.451	.045	.458	9.964	.000	Significant
	Technical Solutions	.101	.041	.121	2.470	.015	Significant
a. Dependent Variable: Pattern of Education @ 95% Confident Level							

© 2021 Global Journals

However, the model indicates a significant relationship between the dependent and independent variables. The P-value indicates the acceptability of each variable in this relationship. Here, student mobility (P=.134<.05); career tension (P=.878<.05); academic effectiveness (P= .613<.05); Self-learning & Development (P=.117<.05) is found insignificant and low impact on the changing pattern of higher education. On the other hand, it is found that Student Readiness (P=.002<.05); Foreign Degree (P=.000<.05); Academic Hessel (P=.014<.05); Virtual Platform (P=.000<.05); Education Transformation (P=.000<.05); Participation Rate (P=.000<.05); Stress & Anxiety (P=.000<.05); Technical Solutions (P=.015<.05). They are found to have a significant impact and contribute to the change of the pattern of education in Bangladesh.

Therefore, we can accept H_2; H_4; H_5, and H_7, which indicates there is a significant impact, and digital solutions and technical advancement p extend a hand to sort out such challenges effectively.

e) Results of Hypothesis Test

Table 15: Hypotheses Test Results

Sl	Hypotheses	Results
H_1	COVID-19 has a significant positive impact on the pattern of higher education	Not Supported
H_2	COVID-19 has a significant negative impact on the pattern of higher education	Supported
H_3	The positive impact changes the pattern of education significantly	Not Supported
H_4	The negative impact significantly changes the pattern of education	Supported
H_5	Changing pattern of education reveals opportunities	Supported
H_6	Changing pattern of education poses cybersecurity challenges	Supported
H_7	Digital solutions and the use of technology significantly helps to puzzle out the challenges imposed by COVID-19.	Supported

f) Results & Findings

1. The academic activities and the pattern of the education system in Bangladesh are transforming into a digital platform. It also changed the habit and concept of a conventional pattern of the education system other than the physical classroom and conventional manner.
2. The selected independent variables in the regression model can predict 87.5% of the impact of dependent variables (Pattern of Higher Education).
3. The correlation indicated that selected variables are interlinked, and paired sample T-test determined a significant impact and changes of the pattern of education during this pandemic compared to the conventional physical classroom.
4. About 87% of the students at the graduate and postgraduate level have prior experience of online academic activities. They consider virtual classrooms as an immediate solution to mitigate the loss due to COVID-19.
5. Online activities enhance the level of expertise on technical literacy, technical experience gaining, which paves the way to digitalization and education transformation.
6. About 64% of the respondents highlighted online academic activities as poor and ineffective.
7. However, the participation rate is not up to the mark because most of them are not ready with equipment and digital means (i.e., device, data pack, and network).
8. It is found students are not getting a proper environment during the class, since most of them are connected from home, which creates external disturbance and noise. This also reduces the attention, involvement, and motivation towards class and lectures.
9. Active participation of all students can be ensured because some of them do not have devices, poor network, and data connection. Moreover, in this lockdown, most of the students are attending class from home in a rural area where network and internet connection is poor.
10. More than 57% of the students face hassle, ambiguity and do not understand the lesson online due to low concentration, poor network, and connectivity.
11. Anxiety, frustration, career tension, psycho-somatic disorder hampers mental and emotional health which leads to lack of commitment, enthusiasm, to academic activities and increase dropout, the commitment to suicide, etc.
12. E-learning is found as a temporary solution to minimize loss and continue academic activities on small scale during this pandemic. Academic activities online are found not fruitful and ineffective due to not having infrastructure, poor participation, lack of expertise to conduct the session, the physical injury made it troublesome, risky, and ineffective.
13. Students and Teachers are facing barriers and challenges like poor infrastructure, lack of prior experience, and inadequate training and development facilities to conduct such academic activities.

© 2021 Global Journals

14. Students are not getting the right environment in online class; higher studies mostly research-based, which require collaboration, group discussion, sharing ideas and thoughts. But unfortunately, all these can not be possible on the virtual platform.
15. Social distance and confinement into a room have a negative impact and consequences on emotion, mental health, and psychology. Moreover, graduates are frustrated regarding a career in this devastating situation, which results in the commitment of suicide; dropout, etc.
16. Attending online classes forced students to be exposed to monitor, mobile for a long time and create a severe physical injury and techno stress, and emotional and psychological disorder in the long run. The study also reveals that teachers and students are cooperative and extending hands together to puzzle out the challenges.

VI. Conclusion

Undoubtedly, Coronavirus has been a curse to the world with its devastating negative consequences in all life spheres. World's giant countries, scientist, researchers, intellectuals keep no stone unturned, but still, this invisible virus is out of control and continue its catastrophe to break the backbone related to economics, social, education and personal affairs. It changes the way people are dealing with each other creating a long distance for safety, social space, and hygiene issues. It also changes the ways students are used to the academic activities in higher education. To cope with the transforming and evolving pattern of the education system is a challenge for the world. Hence, Bangladesh is far behind with the necessary weapons to face the threats.

a) Recommendations

Take home education strategy: Since educational institutions are closed and academic activities are conducted online, students can be trained and enabled to gain expertise on technology to perform and involve in virtual class properly. To capitalize on the transition of the education system, it is required to increase technological literacy, training, and development initiatives need to be arranged both for the students and teacher to arrange and handle online class properly.

Computerized evaluation & student assessment: the evaluation and assessment of students examination, performance is still in the manual form, which may be transformed into the digitalized platform using computer software for evaluation and assessment. The evaluation and assessment system needs to be changed using Artificial Intelligence (AI) technology. Such as *Flexi Quiz, Test Invite; Test Gorilla; Examsoft; Embase*, etc.

Provide resource & infrastructure: Students are required to provide resources, funds, platform, and access to the online class. Besides infrastructural competency, it is necessary to extend support to the students who do not afford devices, networks, and mobile data to attend the classes regularly. Hence, students may be drawn under loan facilities for availing such amities on easy terms and conditions.

Meditation and Counseling: Covid-19 forced students to be confined at home without direct interaction, communication, and collaboration with their fellows. This also has a negative impact and consequences on emotion, mental health, and psychology. Moreover, graduates are frustrated regarding a career in this devastating situation. Hence, the arrangement of medication, mentorship, and counseling can be helpful to overcome the problem. Moreover, job offers, internships, career counseling, and mentorship may heal such tension and frustration to the Graduates.

Cybersecurity & Protection: Cybersecurity and data protection mechanism needs to be improved to avoid bullying, vandalism, unauthorized access to confidential data, and information. Hence, to share resources, proper encryption, confidentiality, privacy, and security can be ensured to ensure cyber vandalism and unauthorized access.

Eliminating Barriers: Formulating an action plan and strategy by eliminating the barriers imposed by COVID-19 can make this digital transition a remarkable revolution in the education system in Bangladesh. Government, educational institutions can identify the barriers in the social, family, individual, infrastructural, and technical arena and take necessary initiatives to overcome them so that students can participate in an online class and other academic activities with commitment and enthusiasm. Student loans on easy terms and conditions to avail devices, technical training, improve technical expertise can be applied to overcome such barriers and problems.

Network, Data Pack, and Devices: due to the poor network, connectivity, and scarcity of devices, students can not be properly involved. Hence, the government can offer a data pack at a cheaper rate from students, special and promotional concessions for the online class, meetings, seminars, webinars, etc. Moreover, as a part of infrastructural development, the network of rural areas can be given priority to strengthening.

b) Avenue for Future Research

COVID-19 undoubtedly has a long-term impact and negative consequences on the education system in Bangladesh. To be benefitted from such an educational transition in this new normal period, there is no alternative to gain advancement in information systems and technology. Hence, the researcher can explore the arena of how information technology, artificial

© 2021 Global Journals

intelligence (AI), can be applied effectively to formulate strategy and design a better education system by fostering digitalization.

References Références Referencias

1. Ahmed Jamal, Professor Dr. M. R. Kabir Majed., 2020. Higher Education in Bangladesh: Status, Issues, and Prospects. *Pakistan Journal of Social Sciences (PJSS),* 30(2), pp. 293-305.
2. Ahorsu D. K., Lin C. Y., Imani V., Saffari M., Griffiths M. D., Pakpour A. H. (2020). The Fear of COVID-19 scale: development and initial validation. *Int. J. Ment. Health Addict.* DOI: 10.1007/s11469-020 00270-8.
3. Alam, Dilruba Khanam Ruba and Shefta Rowshan., 2020. Impact of Covid-19 pandemic on global education systems. *European Journal of Business & Management, 5(2), p.15.*
4. Alamgir, A., Mohiuddin, H., 2020. UGC seeks govt loan, free internet facilities for university students, Dhaka: The Daily Observer.
5. Alon, Uri., 2020. Cyclic strategies to suppress COVID-19 and allow economic activity, Hamerkaz: Weizmann Institute of Science. 3rd Edition, p-24.
6. Al-Tammemi, A. B., Akour, A., & Alfalah, L. (2020). Is It Just about Physical Health? An Internet-Based Cross-Sectional Study Exploring the Psychological Impacts of COVID-19 Pandemic on University Students in Jordan Using Kessler Psychological Distress Scale. https://doi.org/10.1101/2020.05.14. 20102343.
7. Amit Joshi and Muddu Vinay, Preeti Bhaskar., 2020. Impact of coronavirus pandemic on the Indian education sector: perspectives of teachers on online teaching and assessments. *Interactive Technology and Smart Education,* 6(2), p. 34.
8. Arfan Shahzad, Rohail Hassan, Adejare Yusuff Aremu, Arsalan Hussain, Rab Nawaz Lodhi, (2020). Effects of COVID-19 in E-learning on higher education institution students: the group comparison between male and female. *Springer publication.* DOI.org/10.1007/s11135-020-01028-z.
9. Ashrafur Rahman, Efta Khairul Haque Emon, M Shahanul Islam, (2020). Impact of COVID-19 on the Institutional Education System and its Associated Students in Bangladesh. *Asian Journal of Education and Social Studies, 11(2): pp-34-46.*
10. Azorın, Cecilia., 2020. Beyond COVID-19 supernova. Is another education coming?. *Journal of Professional Capital and Community,* 5 (2), pp. 1-5.
11. Bryman, A. & Bell, E. 2003. Business Research Methods, Oxford, Oxford University Press. Chaplin, Steve., 2020. COVID-19: a brief history and treatments in development. *University of Glasgow,* 31(5), pp. 28-38.
12. Chen, Hsiu-Ju., 2010. Chen, H.J. (2010). Linking employees' E-learning system use to their overall job outcomes: An empirical study based on the IS success model. *Computer & Education: Elsevier,* 55(4), pp. 1628-1639.
13. Chen, Li-Ling, 2016. A Model for Effective Online Instructional Design. *Literacy Information and Computer Education Journal (LICEJ),* 6(2), pp. 22-24.
14. Chew Q., Wei K., Vasoo S., Chua H., Sim K. (2020). Narrative synthesis of psychological and coping responses towards emeging infectious disease outbreaks in the general population: practical considerations for the COVID-19 pandemic. *Singapore. Med. J.* 61 350–356. 10.1162 2/smedj.2020046.
15. Chowdhury T. (2020). Fears Grow over Bangladesh's COVID-19 Response. *International Journal of Behavioral Science, 13(8), p.114.*
16. Christie, Taylor., 2020. The Impact of Coronavirus on Education: Prospects & Challaenges. *Journal of Social Science, 3(2),* pp. 12-25.
17. Das, G., 2020. *Impact of Covid-19 on Education*. [online]. Impact of Covid-19 on education | theindependentbd.com. Available at: http://www .theindependentbd.com/post/250457 [Accessed 14 December 2020].
18. DeLone, W. H., McLean, E.R. (2016). Information systems success measurement. Foundations and Trends in Information Systems 2(1), 1–116. DOI: org/10.1561/29000 00005.
19. Dhaka tribune. (2020), Landlords evict students, throw away belongings amid pandemic;[Online]. Available:https://www.dhakatribune.com/banglades h/dhaka/2020/07/02/landlordsevict-students-throw-away-belongingsamid-pandemic.
20. Dr. Muhammad Sougatul Islam., 2020. Online classes for university students in Bangladesh during the Covid-19 pandemic- is it feasible?,Dhaka: BioTED.
21. Durrani, Anayat., 2020. How U.S. Coronavirus Measures Affect International Students, Chigago: U.S News.
22. Dutta, S., & Smita, M. K. (2020). The Impact of COVID-19 Pandemic on Tertiary Education in Bangladesh: Students' Perspectives. *Open Journal of Social Sciences*, 8, pp: 53-68.
23. Foyez M., and Schleicher, A. Reimers., 2020.Pandemic of 2020: A Framework to Guide an Education Response to the COVID-19, Paris.: OECD.
24. Guarner, J. (2020). Three emerging coronaviruses in two decades: The story of SARS, MERS, and now COVID-19. *American Journal of Clinical Pathology, 153(4),* 420–421. DOI:/10.1093/ajcp/aqaa029.

© 2021 Global Journals

25. Halim, S., 2020. Bangladesh to Add Sexual Harassment Topics to School Curriculum: As It Fights Rape. *Journal of Risk andUncertainty, Vanderbilt Law Research Paper,* 20 (42), pp. 24-30.
26. Hans Henri P. Kluge., 2020. The Novel Coronavirus (2019-nCoV),Geneva: WHO. pp.45-92
27. Hargreaves, A., 2020. *"What's next for schools after coronavirus? Here are 5 big issues and opportunities".* [Online] Available at: https://theconversation.com/whats-next-for-schools- after-coronavirushttps://theconversation.com/whats-next-for-schools-after-coronavirus. [Accessed 12 October2020].
28. Harris, A., 2020.Leading a school during lockdown. *International Journal of Behavioral Science, 3(6), pp.12-34.*
29. Harrison, Stephen L., 2020. Improving Online Tertiary Education in the Developing World Based On Changes in Perceptions Post COVID-19. *Swiss School of Business Research, Zurich, Switzerland,* 3(7), pp. 19-25.
30. Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. The Lancet, 395(10223), 497–506. DOI: 10.1016/S0140-6736.
31. Islam D., Tanvir K, Amin DM, Salman M., (2020), Online classes for university students in Bangladesh during the Covid-19 pandemic-is it feasible? [Online].Available:https://tbsnews.net/thoughts/online-classes-university-studentsbangladesh-during-covid-19-pandemic-itfeasible-87454. [Accessed 12 October 2020].
32. Jayasree Nath, Abdullah Fahim Chowdhury, Amit Kumar Nath., 2020. Analyzing COVID-19 Challenges in Bangladesh. *Preprints,* 4(2), pp. 2-6.
33. Joshi, A., Vinay, M. and Bhaskar, P., 2020. Impact of coronavirus pandemic on the Indian education sector: perspectives of teachers on online teaching and assessments. *Interactive Technology and Smart Education, 12(4),* p.13
34. Joyce Lau, Bin Yang Rudrani Dasgupta., 2020. *P the coronavirus make online education go viral?.*[Online] Available at: https://www.timeshighereducation.com/features/p-coronavirus-make-online-education-go-viral. [Accessed 14 October 2020].
35. Kapasia, N.; Paul, P.; Roy, A.; Saha, J.; Zaveri, A.; Mallick, R.; Barman, B.; Das, P.; Chouhan, P., 2020. Impact of lockdown on learning status of undergraduate and postgraduate students during COVID-19 pandemic in West Bengal, India.
36. Kedraka, K., & Kaltsidis, C. (2020). Effects of the Covid-19 Pandemic on University Pedagogy: Students' Experiences and Considerations. *European Journal of Education Studies,* 7(1), p.82. DOI:10.46827/ejes.v7i8.3176.
37. Khan, S. and Khan, R.A. (2019), Online assessments: exploring perspectives of university students, *Education and Information Technologies, 24(3),* pp. 661-677.
38. Lavender Huang., 2020. *Trump's travel ban means I'm stuck in China while my school reopens.*[Online].Availableat: https://www.inquirer.com/opinion/commentary/f-1-visa-travelban-international-students-coronavirus-covid-202000806. html [Accessed13 September 2020].
39. M.A., Khan, S., Kazmi, A., Bashir, N., Siddique, R. Shereen., 2020. COVID-19 infection: Origin, transmission, and characteristics of human coronaviruses.. *Journal of Advance Research,* 24(7), pp. 91-98.
40. Mahtab Uddin (2020). Effects of the pandemic on the education sector in Bangladesh. *International Journal of Scientific Research. 15(4),* p.13.
41. Majed, K., 2020. *Online Education: Bangladesh Perspective, Challenges and Way Forward.* International Journal of Business & Management. 13(7), p.11.
42. Mamun MA, Chandrima RM, Griffiths MD., (2020). Mother and son suicide pact due to COVID- 19-related online learning issues in Bangladesh: An unusual case report. International *Journal of Mental Health and Addiction. 6(5)*p .22.
43. McCoole, M., Boggiano, N., & Lattanzi, O. (2020). Transitioning during COVID-19: Student Perspectives. *Interactive Qualifying Projects. 14(1),* p.37.
44. Mobasser, & Hasan Muhammad Baniamin., 2010. Higher Education in Bangladesh: Status, Issues and Prospects. *Pakistan Journal of Social Sciences (PJSS),* 30(2), pp. 293-305.
45. Mohamed, M. H., Ahmed, S. A., Hussein, A. M., Ahmed, A. S. A., Mohamed, I. I., & Sheikh, A. M. (2020). The Impact of Coronavirus (COVID-19) on Higher Education Case Study Private Universities in Mogadishu, Somalia. *Creative Education, 11*(1), pp.2249-2261. DOI:10.4236/ce.2020.1111165.
46. Mohammadi, H. (2015). Investigating users' perspectives on E-learning: An integration of TAM and IS success model. *Computers in Human Behavior 45(2),* pp: 359–374. DOI.org/10.1016/j.chb.2014.07.044.
47. Muhammad, K., &Roblyer., 2015.Introduction to systematic instructional design for traditional, online, and blended environments. 3rd ed. New Jersey: Pearson Education, Inc.
48. Murray, D.R.; Bangerter, A.Schaller, M., 2015. The behavioral immune system: Implications for social cognition, social interaction, and social influence. *International Journal of medical research. 12(3),p.36.*
49. Nataliia Stukalo & Anastasiia Simakhova (2020), COVID-19 Impact on Ukrainian Higher Education,

© 2021 Global Journals

Universal Journal of Educational Research 8(8), pp. 3673-3678, DOI: 10.13189/ujer.2020.080846.

50. O'Neill, D. K. and Sai, T. H. (2018), "Why not? Examining college students' reasons for avoiding an online course", *Higher Education.* 68(2), pp. 1-14, DOI: 10.1007/s10734-013-9663-3.
51. Owusu-Fordjour, C., Koomson, C. K., & Hanson, D. (2020). The Impact of Covid-19 on Learning—The Perspective of the Ghanaian Student. *European Journal of Education Studies,* 7, 88-101.
52. Petter, S., DeLone, W., McLean, E.R. (2013). Information systems success: The quest for the independent variables. *Journal of Management Information Systems* 29 (4), 7–62. DOI: org/10.2753 /MIS07 42-12222 90401.
53. Pravat Kumar Jena., 2020. Impact of Covid-19 on higher education in India. *International Journal of Advanced Education and Research,* 5(3), pp. 77-81.
54. Preiser, W., van Zyl, G., & Dramowski, A. (2020). COVID-19: Getting ahead of the epidemic curve by early implementation of social distancing. *South African Medical Journal,*2(7) p.13. DOI:10.7196/S AM.2 020.v110i4.14720
55. Raj Kishor Bisht, Sanjay Jasola, Ila Pant Bisht., 2020. Acceptability and challenges of online higher education in the era of COVID-19: a study of students' perspective. *Asian Education and Development Studies,* 4(7), p. 23.
56. Ramachandran, Sudha., 2020. The COVID-19 Catastrophe in Bangladesh. *International Journal of Education Research. 7(2), p.56.*
57. Redden & Elizabeth., 2020. International and Study Abroad Students See Major Disruptions,NewYork: Inside Higher Education.
58. Saeed, A., & M. Nasrullah., 2020. COVID-19 and Bangladesh: Challenges and How to Address Them? *Frontiers in Public Health. . 3(2), p.16.*
59. Sijia Li, Yilin Wang, Jia Xue, Nan Zhao, and Tingshao Zhu., 2020. The Impact of COVID-19 Epidemic Declaration on Psychological Consequences: A Study on Active Weibo Users. *International Journal of environment & Public Health,* 17 (16), pp. 2-9.
60. Uddin, F., 2020. *Digitalization of the Education System- Why Hasn'T Bangladesh Achieved It Yet?*. [online] DATA BD.CO. Available at: https://data bd.co/stories/digitalization-of-the-education-system-why-hasnt-bangladesh-achieved-it-yet11896 [Accessed 15 December 2020].
61. UGC, 2020. List of public & private universities. *University Grant Commission.* [Online] Available at: http://www.ugc-universities.gov.bd/private-universiti es. [Accessed 7 September 2020].
62. UNESCO, 2020. *COVID-19: 10 Recommendations to plan distance learning solutions,* Geneva: Unesco. p.127.
63. UNESCO, 2020. *Policy Brief: Education During COVID-19 & Beyond.* [Online] Available at: https://www.un.org/development/desa/dspd/wpcont ent/uploads/sites/22/2020/08/sg_policybrief_covid1 9_and_education_august_2020.pdf.[Accessed 10 september 2020].
64. University Grants Commission of Bangladesh, U., 2020. *List of Public Universities | University Grants Commission of Bangladesh*. Dhaka.
65. W.K. Viscusi., 2020. Pricing the Global Health Risks of the COVID-19 Pandemic.*Journal of Risk and Uncertainty, Vanderbilt Law Research Paper,* 20(42), pp. 24-30.
66. WHO, 2020. *World Health Organization.* [Online] Available at: https://www.euro.who.int/en/health topics/health-emergencies/coronavirus-covid-19/ne ws/news/2020/3/who-announces-covid-19-outbreak -a-pandemic.[Accessed 8 September 2020].
67. Wiedermann W., von Eye A. (2015). Direction of effects in mediation analysis. *Psychol. Methods*. DOI: 20 221–244. 10.1037/met0000027.
68. WorldBank, 2020. *Guidance Note on Education Systems' Response to COVID19.* [Online] Available at:http://pubdocs.worldbank.org/en/4508815852359 50757/COVID19Education-Sector-Guidance-Note-M March26.pdf. [Accessed 10 September 2020].
69. Yash Nitin Divadkar Islam., 2020. The impact of COVID-19 is driving a long-overdue revolution in education. *International Journal of Mangement. 12(2). P.23.*

© 2021 Global Journals