
Article

Relevance to the introduction of eLearning on Higher Education of Bangladesh: An experience from the educational cost of COVID-19

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Abstract

The great lockdown of the current COVID-19 pandemic has significant consequences on the global Higher Education Studies (HES). To find the relevance of eLearning in the HES, our study calculates the economic costs of higher education during Covid-19 in Bangladesh, which includes both students' cost and institutional cost. The study used a purposive random sample survey conducted on 105 students enrolled in higher education in different categories of institutions to identify the students' cost during this pandemic. The institutional cost of higher education is analyzed by breaking down the budget allocated in the education sector in Bangladesh and reviewing the literature. The result indicates that the HES of Bangladesh experiences a huge economic cost due to this pandemic and the study found eLearning can reduce the economic impact of HES. In the post-COVID-19 world, higher education will never be the same because many institutions that already had experience a huge advantage from online learning. The findings of the study might be helpful for the policymakers to frame effective education policies during any bizarre situation that creates huge cost in higher education sector.

Keywords: COVID-19; eLearning; higher education; economic cost; lockdown and Bangladesh.

1. Introduction

The coronavirus pandemic caused by SARS-CoV-2 virus affected all areas of our daily life. The large number of COVID-19 patients and deaths has led to greater levels of emotional stress, requiring workers to continuously use their hardiness skills (Vagni, M et.al. 2021). Unlike previous pandemics, COVID-19 spread all around the globe and poses a drastic impact on education, travel, and international trade in addition to health issues (Tufan, 2020). The impact of this shocking pandemic in education involves every tier of the education system (primary, secondary, and tertiary). Higher education studies (HES), referred as the basic requirements for employment, is crucial for the current and future economy as it produces the caliber and diversity of the

graduates, prepares the professionals, researchers, and innovators (World Bank, 2020). But the global HES community is facing serious challenges amid coronavirus pandemic (Crawford, 2020).

Following WHO's pandemic strategies, such as social distancing, lockdown, travel ban etc., educational institutions are in unscheduled closure (Askari, 2020). The number of students stuck at home is estimated 1.37 billion which is 80% of the global student population (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2020). Many countries moved toward distance learning following the ban in the face to face education, but started to face new challenges emerged from the equity issues, infrastructure, broadband capacity, and pedagogic capacity (World Bank, 2020).

Bangladesh, which has the most Covid-19 cases in South Asia after India and Pakistan, detected the first case on March 8, 2020. Bangladesh first started a nationwide lockdown on March 26, 2020 and has expanded many times, including the educational institutions across the country in response to new cases found (Khan, 2020). The higher education of Bangladesh has been confronting major challenges due to Coronavirus pandemic. According to Ahmed (2020), 4 million students of HES in Bangladesh of over 5,000 institutions including public and private universities, affiliated colleges, and professional institutions are in lockdown from March 26, 2020. The general lockdown for the whole country was extended till May 30, 2020, but the education sector is still in an unscheduled closure and will continue until a considerable improvement of the situation (Ahmed, 2020). In addition to the educational loss, the prolonged shutdown may cause a heavy economic cost as both education providers and the students need to maintain a fixed cost regardless of whether the educational institutions are open or closed.

To minimize the adverse shock of a prolonged closure, distance learning is the only way to continue educational activities. One way of distance learning is online delivery which is more perfectly used in the countries well equipped with the required equipment and other forms of the distance learning include email delivery, television, radio, and mobile applications (World Bank, 2020). But ensuring equal access to distance learning remains a challenge considering the affordability and availability of remote learning equipment. In Bangladesh, only 5.6% of households own a computer or tablet, the internet is accessed in only 37% of the households, 50% of the households have a television (Alamgir, 2020). Despite all the limitations, the distance learning remains the only option to minimize the disturbance (Askari, 2020).

To introduce new policies with a view to overcoming the crisis it is essential to estimate the economic cost due to COVID-19. There are a very limited number of researches conducted which relates COVID-19 in Bangladesh, almost all the studies focused on medical and health issues. Some newspaper articles highlighted the impact of COVID-19 on education in Bangladesh but none of them underscored the economic loss in a scientific way. In Bangladesh, no exact data on the financing of the higher education sector is available. By using different literature and self-constructed survey this study estimates the economic loss during this pandemic.

The coronavirus pandemic has resulted in almost 122,315,998, confirmed cases and almost 2,701,450 deaths globally as on March 20, 2021 (John Hopkins University of Medicine, 2021). In this trend, Bangladesh surpasses about 566,836 coronavirus infections and about 8,642 death on March 20, 2021 (worldometer, 2021). Throughout the literature, there is consistent evidence that the pandemic is a dynamic situation, will affect not only the health sector, but the education sector also. There is increasing concerned that the economic outcomes of coronavirus will also affect the educational institutions and their measures for the long run (Burgess & Siversten, 2020; Johnson, Coleman & Batten, 2020).

Several empirical studies like Burgess & Sievertsen (2020) found that the global lockdown of education institutions is going to cause a major (and likely unequal) interruption in the students' learning. This reality is also supported by Johnson, Coleman, & Batten (2020), they observed that the Impacts from the pandemic have enlarged PhD students' financial strain to the point that may result in many being forced to departure research studies. Even though teaching is moving online, on an untested and unprecedented scale, this is evident that COVID-19 has affected all levels of the education system, from pre-school to tertiary education (Nicola, Alsafi, Sohrabi, Ahmed, Al-Jabir, Iosifidis, Agha & Agha, 2020).

Meltzer, Cox & Fukuda (1999) examined the likely economic effects on the influenza pandemic in the USA and evaluate several vaccine-based interventions. At a gross attack rate of 15-35%, the number of influenza deaths is 89-207 thousand and estimated mean total economic impact for the US economy is D73.1- D 166.5 billion. In the current situation, World Bank predicted COVID-19 could be the reason of extreme poverty for 40-60 million population worldwide (Mahler, Lanker, Aguilar & Wu, 2020)

In a recent study, Nunu (2020) argued that service-oriented economies will be particularly negatively affected and have more jobs at risk. Developing countries will be more affected by this crisis (more than 15% of GDP). The results suggest that on average, each additional month of crisis costs 2.5-3% of global GDP. So, dropout is the ultimate reality of post pandemic Bangladesh because of certain economic recession. In the UK, a £427 bn package of emergency loan guarantees to help those in financial difficulty (Nicola et al., 2020). The policy actions at the beginning of the crisis, during the crisis and in post-crisis will be different. The impact of the COVID-19 is now compared to the economic crisi of the Great Depression in 1930 (Illiot, 2020).

In our study, we explore the economic impact of higher education in Bangladesh and address some cost minimizing issues. Nawaz & Muhammad (2017) found that there are recognized differences between the success and failure factors in the developed and developing countries with regard to the development and use of eLearning in Higher Education Studies (Allah Nawaz, 2017). According to Sampa Iftekhar (2016), the best advantage of distance learning is one can learn from it anywhere and at any time . It does not a matter in which part of the world students are living in. Students also could easily get access to course materials. Nagrale (2013) suggests that Google classroom is one of the most well-known platforms of enhancement of teachers' workflow. Tin-Chun Lin suggests (2020) that online experiments exerted a positive and significant effect on student learning outcomes. On the other hand Dutta & Smita (2020) mentioned that due to COVID-19 pandemic, financial crisis impacted on students learning. Many students lived off some part-time works for bearing their educational expenses. In this pandemic, all part-time jobs stopped. Even their household earnings

significantly reduced as pandemic already hit hard the economy of the sphere as well as Bangladesh. As the students had to depend on their families for daily needs, it was a problem for them to manage money for buying internet with the high cost to attend online classes.

A very meager amount of study has been observed focusing on the coronavirus impacts on HES in Bangladesh. Almost all the studies are from health and medical context. To date, some newspaper articles focused on the impact of the current pandemic on HES and probable solution of the crisis. However, none of them identified the relevance to introduce online education to reduce economic cost in HES in Bangladesh. Thus, this study may be helpful for the policymakers to shape educational management strategies during and post-pandemic Bangladesh. This paper encompasses 5 sections. The next section provides a review of the results to the relevance of introducing eLearning on HES. Section 3 describes the discussion part, section 4 describes the materials and methods, section 5 summarizes the study by incorporating some policy implications.

2. Results

This study attempts to find the institutional loss due to the pandemic as the institutions need to spend a fixed amount even if the colleges and universities are shuttered. Table 4 represents the institutional loss in HES in Bangladesh. The result indicates that the institutions' per day expenditure is USD 2.90 million. However, the expenditure in HES varies according to the category of the universities. The highest per student per year is observed in the public universities which is 83-fold of that of the national university. The national university provides higher education through the colleges for a large number of students, but the total expenditure allocated is the lowest comparing with other types of universities.

Table 1. The institutional cost

University Type	Total Students	The institutional investment for per student yearly (current value) BDT		Per day cost (million) BDT/ USD
		Total	Yearly cost (BDT)	
National University	2788783	815	2272858145	6.23 (USD 0.073)
Public University	818040	68093	55702797720	152.61 (USD 1.79)
Open University	333615	3821	1274742915	3.49 (USD 0.041)
Private University	361792	85196	30823231232	84.45 (USD 0.993)
Total	4302230	157925	90073630012	246.78(USD2.90)

Source: UGC's annual report 2018 and Universities website.

Note: Yearly institutional investment for per student was P indicates BDT 741 for National University, BDT 61900 for Public University BDT 3474 for Open University, BDT 77451 for Private University in 2018, the rate of interest is assumed $r = 10\%$ and $n=1$. We used future value formula $FV = p(1 + r)^n$ to find the current monetary value in terms of 2018.

Students also have the fixed cost regardless of whether the institutions are open or closed. To find the students' individual cost this paper uses 40% Trimmed mean method by removing the lowest 20% and the highest 20% value. Table 5 summarizes the students' individual loss during the current pandemic based on the survey result. The survey result is analyzed in appendix 1. Per students per day individual cost is higher for the students from the private university whereas students from the Open University spend the least amount. The total number of students in higher education is 4302230 and the students' total cost per day is estimated as USD 5.82 million. Students at the private universities spend the highest individual cost compare to other categories. However, per day total cost is found highest for the national university as the number of students is much higher than in other categories.

Table 2. Students' individual cost

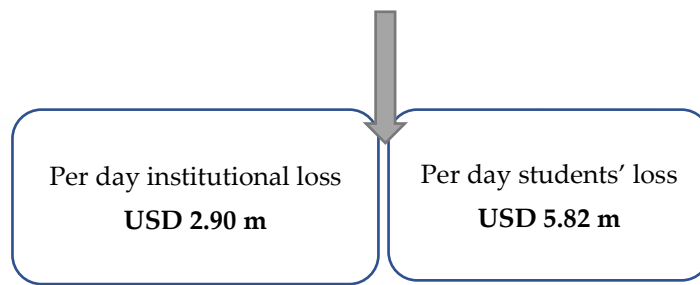
University Type	Total Students	per student per day expenditure	12 months cost (BDT)	per day cost in million BDT (USD)
National University	2788783	109	110951731655.00	303.98 (\$ 3.58)
Public University	818040	125	37323075000.00	102.26 (\$ 1.20)
Open University	333615	111	13516411725.00	37.03 (\$ 0.44)
Private University	361792	143	18883733440.00	51.74 (\$ 0.61)
Total	4302230	Using 40% TMM	180674951820.00	495 (\$ 5.82)

Source: Authors' estimation

So, per day institutional cost and students' individual cost of higher education during pandemic are found USD 2.90 m and USD 5.82 m, respectively. Summing up these two costs, the total economic cost due to the pandemic becomes USD 8.72 m per day. Figure 3 breaks down the per day total loss in higher education. The result is consistent with the total cost of higher education estimated by the World Bank (Rahman, Nakata, Nagashima, Rahman, Sharma, and Rahman, 2019)

Figure 1. The total cost in higher education

Per day total cost of Higher
Education
USD 8.72 m



Source: authors' estimation

However, the whole cost calculated so far is not the loss due to the pause in educational activities caused by COVID-19 as some institutions are continuing their academic activities through online.

Literature suggests that a very few numbers of students in HE is involved in the online learning in Bangladesh. Our survey result also reveals the same findings. As the objective of this study is to derive the economic cost in higher education, we need to consider the students continuing their studies using online method. Table 6 represents Students' learning method during this coronavirus pandemic. Only 20% of the sample students are continuing their studies through online method. However, 10% of the students are independent learner and 5% of the students are going through the family-centered learning. Our findings from the survey is consistent with Islam, Tanvir, Amin & Salman (2020) as their survey suggests that 23% of the students in HE is going through the online education method.

Table 3. Students Learning Methods during Covid-19

Learning Method	Number	Percentage
Online	21	20%
Independent	11	10%
Family_ centered	5	5%
Zero learner	68	65%
Total	105	100%

Source: Survey result

Following the survey result, we need to deduct the cost of 20% of the students' cost to find the net economic loss in higher education as they are continuing the study. We are ignoring the independent learners and family-centered learners as they are not in any institutional procedure. Removing 20% online learners, the total economic cost of remaining 3,441,784 students becomes USD 6.96 m. As Bangladesh is going through a closer in the academic institution from Mid-March, the total loss becomes USD 835.2 m as of Mid-July. Thus, it projects that the economic loss in HES will be USD 252.8 m and USD 2540.4 m if the pandemic prolongs for 6 months and 12 months respectively if institutions remains closed and does not improve the online learning coverage. Table 7 covers the projection of economic loss in HES in Bangladesh due to the current pandemic.

Table 4. Projection of economic loss in HE caused by COVID-19 pandemic

Daily net loss (million in USD)	Loss so far (million in USD)	Projected loss for 6 months (million in USD)	Projected loss for 12 months (million in USD)
6.96	835.2	252.8	2540.4

Source: Authors' estimation

Here, we have calculated the expenses of students as well as institutions. The study found 35% students continuing their learning during pandemic where 20% are learning directly from the institutions via online. So this 20% investment is effective and the remaining 80% investment on higher education of Bangladesh is considered economic loss due this pandemic. Table 7 shows that the amount of projected loss for 12 months is USD 2540.4. In this case if it is possible to introduce eLearning for all HES in Bangladesh then this huge loss turns to an investment.

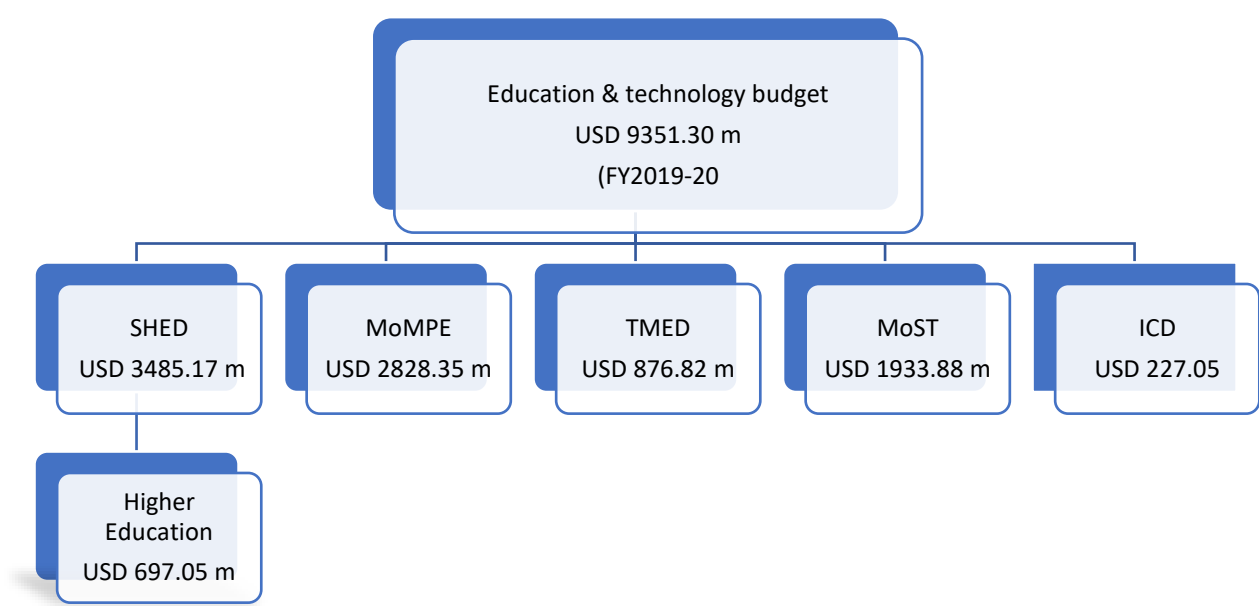
3. Discussion

According to the estimation the economic cost due to the pandemic becomes USD 8.72 m per day in higher education sector. In Bangladesh, higher education is provided by three ways: diploma programs in polytechnics under the technical and vocational education and training (TVET), graduate and post-graduate programs in universities and affiliated colleges under the National University Universities are autonomous entities that provide HE and undertake research and innovative activities under University Grant Commission (UGC) of Bangladesh (Ministry of Education [MoH], 2020; University Grant Commission of Bangladesh, 2020). Colleges under the national university are typically less autonomous teaching oriented HE entities.

Higher education sector in Bangladesh is under the authority of the Ministry of Education (MoE). The Ministry of Education has two division, Secondary and Higher Education Division (SHED) and Technical and Madrasa Education Division (TMED). The SHED is liable for secondary education and HE, while the TMED is accountable for TVET and 'Madrasa'. In terms of legislative framework, there has been no specific legal framework to provide regulatory directives in the HE sector (Rahman, Nakata, Nagashima, Rahman, Sharma and Rahman, 2019). Thus, the National Education Policy (NEP) 2010 to some extent describes the overall development of the HE sector. The NEP 2010 defines the MoE as the top body for policy direction and management of the HE sector in Bangladesh. The SHED of the MoE manages the HE sector through DSHE and one attached body UGC. The UGC, is the authority for managing and coordinating public and private universities, maintaining the quality of university education, managing the allocation of government funding to universities (Rahman et al., 2019).

The exact allocation of HE budget is difficult to identify because of the aggregate allocation of the budget on education system. SHED is accountable for both secondary and HE but higher secondary student’s budget is included in HE budget. In this case different literature and Budget analysis of SHED help us to find the HE budgets. Figure 1 exhibits the budget for education in Bangladesh.

Figure 2. Distribution of Education and Technology Budget in Bangladesh



Source:

Bangladesh Budget (2019-20)

Note: SHED is Secondary and Higher Education Division, MoMEPE is defined as the Ministry of Mass & Primary Education, TMED is the Technical and Madras Education Division, MoST indicates Ministry of Science & Technology, and ICD is Information and Communication Department. 20% of SHED is allocated in higher education (Rahman et al., 2019).

HE contributes to the development of a hypercritical mass of professionals and experts needed for sound economic development in modern knowledge-driven economies. So increased budgetary allocations toward investment in HES is highly justified.

Bangladesh provides a relatively low public funding allocations to the tertiary education compared to an international standards and in terms of proportion of GDP spending in education, Bangladesh is placed 155th out of 166 countries (Rahman et al., 2019).

Bangladesh, which has the most Covid-19 cases in South Asia after India and Pakistan, first started a nationwide lockdown on March 26, 2020 and has expanded many times, including the educational institutions across the country in response to new cases found (Khan, 2020). As of 20th May 2021, Bangladesh surpasses about 785,194 coronavirus infections , 12,284 death and mortality Rate is 1.53%. (worldometer, 2021).

Table 1 encapsulates the scenario of COVID-19 in Bangladesh with taking the rate of percentage change of indicators into consideration. The number of tests shows an increasing trend until the first week of the July and so the rate of positive cases. The number of test decreases probably due to the introduction of charge for testing the coronavirus (“Government fixes”, 2020). From the second week of July, the number of people tested is observed to follow a decreasing fashion, but the percentage of test reported positive remained significantly high. It implies that thanks to the lower cases of tests, the number of positive cases is low even though the people are being infected at a very high rate. Initially, the recovery rate was quite low until the first week of June, it however started to increase drastically from the second week. Unlike the rate of positive cases and rate of recovery, the death rate was initially so high in Bangladesh, but decreased eventually in a continuous pattern.

Table 5. Rate of COVID-19 positive cases, recovery rate and death rate in Bangladesh.

Fortnights	No. of Test	No. of new cases	Rate of positive cases	Recovery	Recovery Rate	Death	Death Rate
8/3 -23/3	509	5	0.98	5	100.00	3	60.00
24/3 - 7/4	3669	144	3.92	28	19.44	14	9.72
8/4 - 22/4	28341	3608	12.73	59	1.63	103	2.85
23/4 - 8/5	78824	9362	11.87	2009	21.46	86	0.91
9/5 - 23/5	123221	18944	15.37	4385	23.15	246	1.29
24/5 -7/6	163312	33691	20.62	7417	22.01	103	0.30
8/6 - 22/6	232732	50017	21.49	32852	65.68	947	1.89
23/6 - 7/7	245761	52659	21.42	31347	59.52	649	1.23
8/7 - 22/7	193129	44809	23.20	39100	87.25	600	1.33
6/5/2021- 20/5/2021	290035	32730	12.85	27820	85.00	780	2.38

Source: Worldometer, 2021

Note: Rate of the positive case is the percentage of the test case reported positive, recovery rate defines the percentage of infected people recovered, and the death rate indicates the percentage of the infected people died.

4. Metarials and Methods

The study mainly focuses on two types of costs: institutional cost, and students' individual cost. Institutional costs are the amount of the government spending in higher studies and the student's individual costs are the expenses the students spending in terms of rent, expenses on food and other personal costs. Data have been collected from both primary and secondary sources. We collected data randomly from 105 different graduates using purposive random sampling from 8 different divisions of Bangladesh, among them 78 % respondents were male and rest of them were female. We collected data from 40 students of the public university, 47 students of the National University, 2 students of the Open University and 16 students of the private university over the phone. We interviewed through a structured questionnaire from 26 March, 2020 to 18 July, 2020 to know their economic impact (e.g. average expenditure per month). Table 2 presents a category-wise distribution of the sample.

Table 6. Category-wise sample distribution

Category	Division								Total
	Dhaka	Chattogram	Sylhet	Rangpur	Barisal	Rajshahi	Khulna	Mymensing	
Male	9	12	21	12	9	7	6	6	82
Female	4	3	5	3	1	2	4	1	23
Total	13	15	26	15	10	9	10	7	105
Percentage	12.38	14.29	24.76	14.29	9.52	8.57	9.52	6.67	100

Source: primary data collected through survey

To identify the institutional loss in HES the study used the HES budget following Bangladesh's national budget for the fiscal year 2019-20. We used 155 sources and Table 3 summarizes the sources used in the study. The estimation of the total loss on education requires to know the number of students in HES. This study detected the number of students with summing up the online information provided in the website of the Ministry of Education, The University Grant Commission of Bangladesh, and universities in Bangladesh. The universities along with their web address and number of students are enlisted in appendix 2.

Table 7. Sources used for analysis

Survey type	Example	Number	Percentage
University websites	www.ugc.gov.bd	123	79.36

Higher education related Information	Budget of Bangladesh (2019-20)	5	03.22
Journals	IOSR Journal of Business and Management	23	14.84
The Daily News paper	www.dailystar.net	4	2.58

Source: Authors' estimation

To determine the individual students' cost the study applied Trimmed mean method. Trimmed Mean method is an averaging technique, often used in reporting economic data, which adjusts the outliers by eliminating a small portion of the exceptionally large and small values (Kenton, 2020). Then we calculated Institution's expenditure per students yearly from Government budget (2019-20) and University Grants Commission's annual report 2018 (The University Grants Commission of Bangladesh, 2020) different literature review and turned all monetary value to the current value by using future value formula. Hence, the study derives the total economic costs in HE by summing up both students' individual cost and institutional cost. Finally, we derived the net loss in HE during pandemic by removing the cost of the students continuing their study online.

5. Conclusions

This paper investigated an economic cost in higher education sector in Bangladesh caused by the coronavirus pandemic using both primary and secondary data. The primary data collected from 105 students enrolled in the higher study through the purposive random sampling which includes the individual student's economic cost due to closure of an academic activities. The secondary data covers the institutional cost analyzing the budget allocation for the education sector. The findings confirm that the HES in Bangladesh faces significant economic cost due to the COVID-19 outbreak. As the economic loss due to the pandemic is huge, the result suggests that the cost may be minimized by introducing different forms of distance learning. It showed that the learning disturbances, physical and mental health problems, financial crisis, caused by the outbreak of COVID-19 pandemic, had discrepant consequences on HES students' learning behaviors. This study also highlighted that shifting to online education for continuing education created disappointment due to some unavoidable issues concerning virtual learning environment. Hence some planned finance would help the students, teachers, educationists and government in Bangladesh to reduce the educational loss. To avoid more loss in higher education, the study further suggests to take some bold steps, such as initiating online training for the teachers, forming a central video-streaming channel including free downloading option, ensuring free internet connection and environment for teachers and students. Thus, the current study may be helpful for the policymakers to form the policy to overcome the crisis in any atypical situation. However, the possible optimal number of students is essential to identify to run the distance learning method effectively. The study offers an avenue for further research on the feasibility and the probable outcome of distance learning in higher education in Bangladesh.

Data Availability Statement: The data are available on request from the corresponding author.

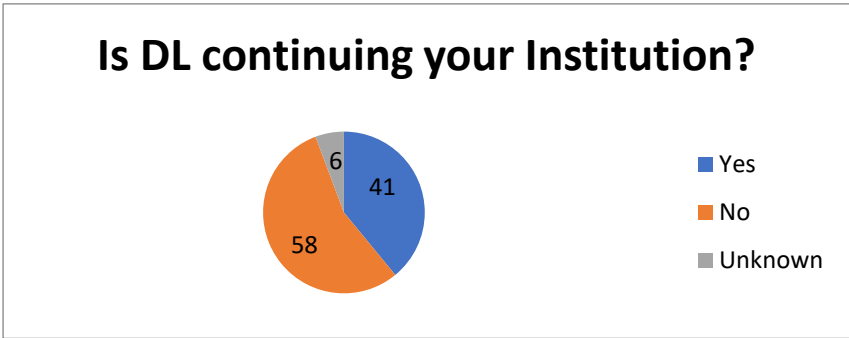
Author Contributions: Conceptualization, Sajib Dey, Md. Gias Uddin Khan and Md. Hakim; Data curation, Sajib Dey; Formal analysis, Sajib Dey; Funding acquisition, Sajib Dey; Investigation, Sajib Dey, Md. Gias Uddin Khan and Md. Hakim; Methodology, Sajib Dey, Md. Gias Uddin Khan and Md. Hakim; Project administration, Sajib Dey; Supervision, Sajib Dey; Writing – original draft, Sajib Dey; Writing – review & editing, Md. Gias Uddin Khan and Md. Hakim.

Funding: This research received no peripheral funding.

Conflicts of Interest: The authors declare no conflict of interest.

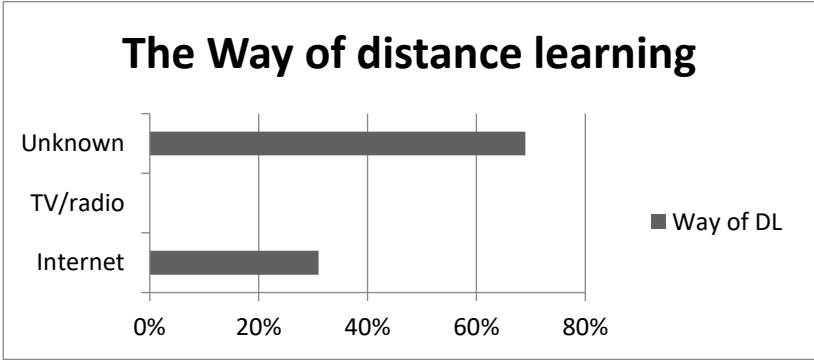
Appendix 1: Survey Result

1. Is Distance Learning (DL) continuing in your institution during Covid-19?



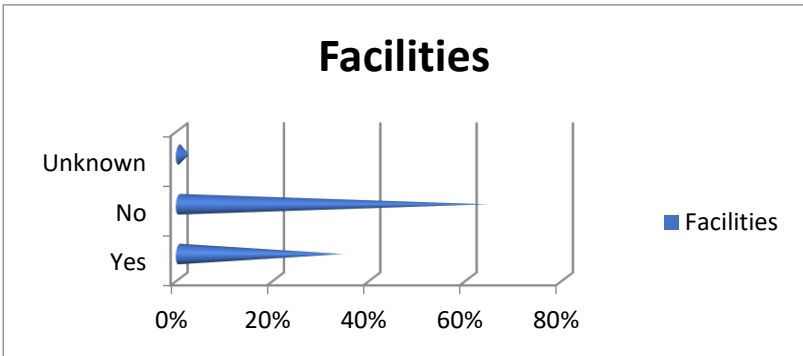
2. In which way Distance Learning (DL) is imple-

menting in Bangladesh?

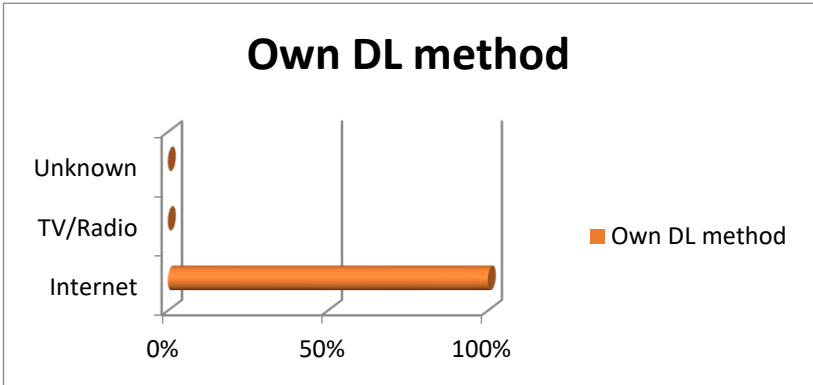


3. Have you enough facilities

to avail DL?

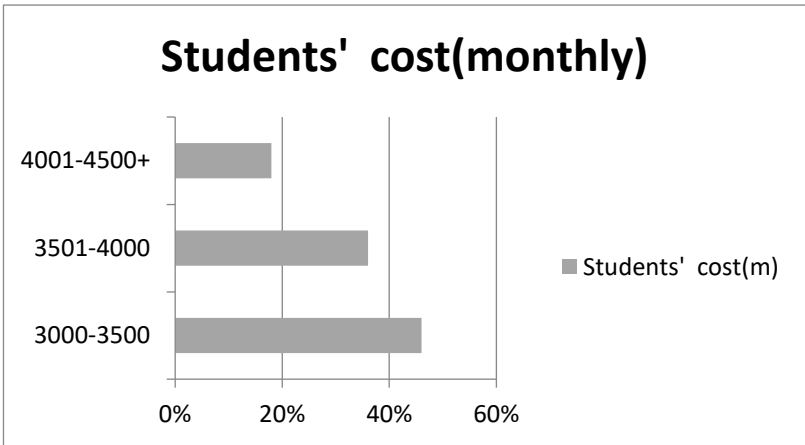


4. What is your DL method?



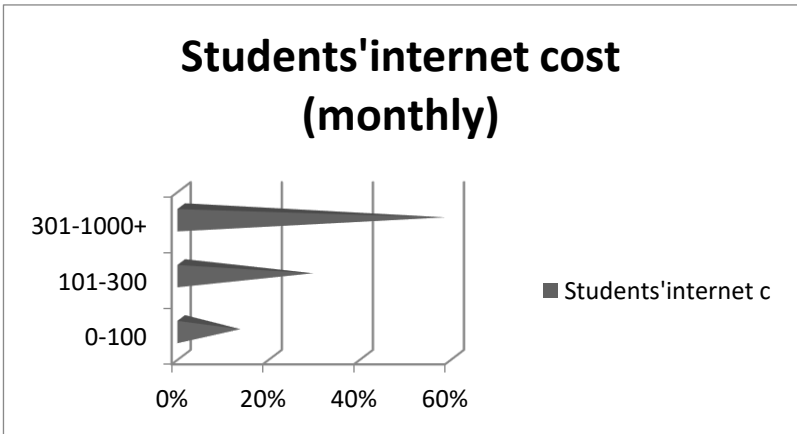
monthly for food and house rent (If any) during Covid-19?

5. How much you spend

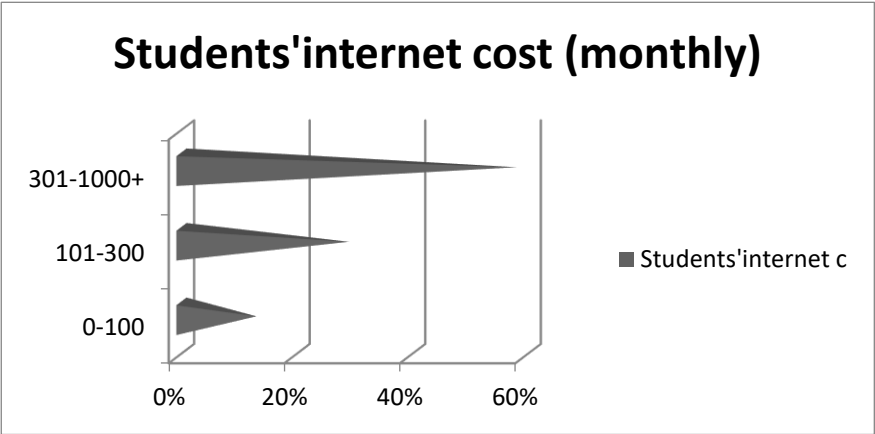


ternet in the Covid-19 period?

6. What is your approximate average cost (If any) for the In-

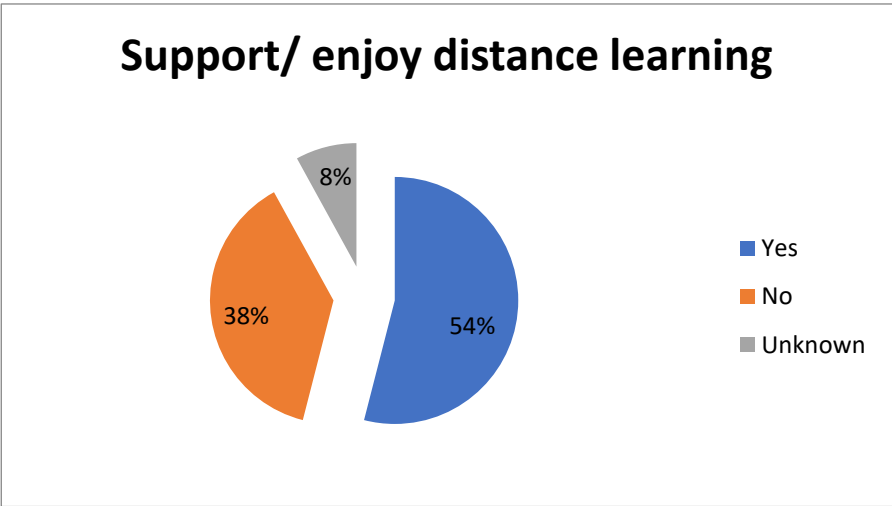


7. What was your monthly average cost in the pre-Covid-19 situation?

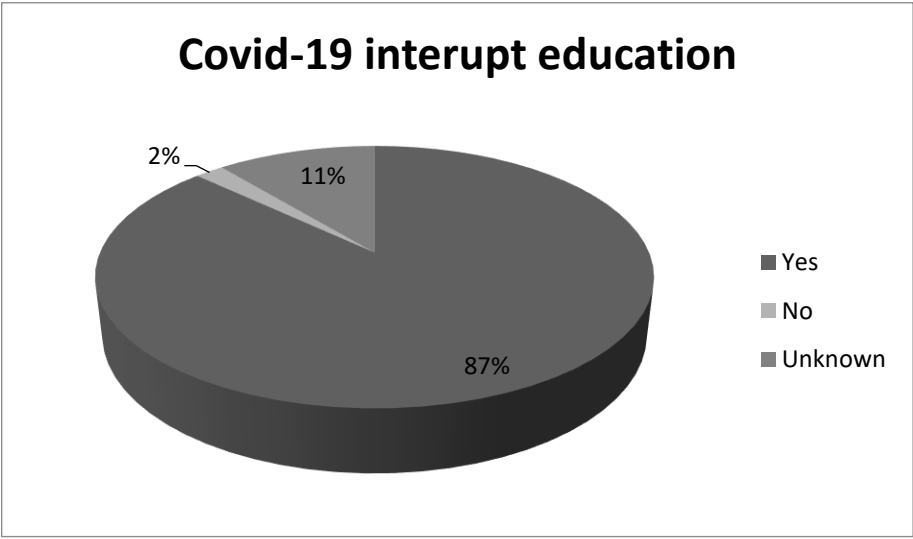


8.

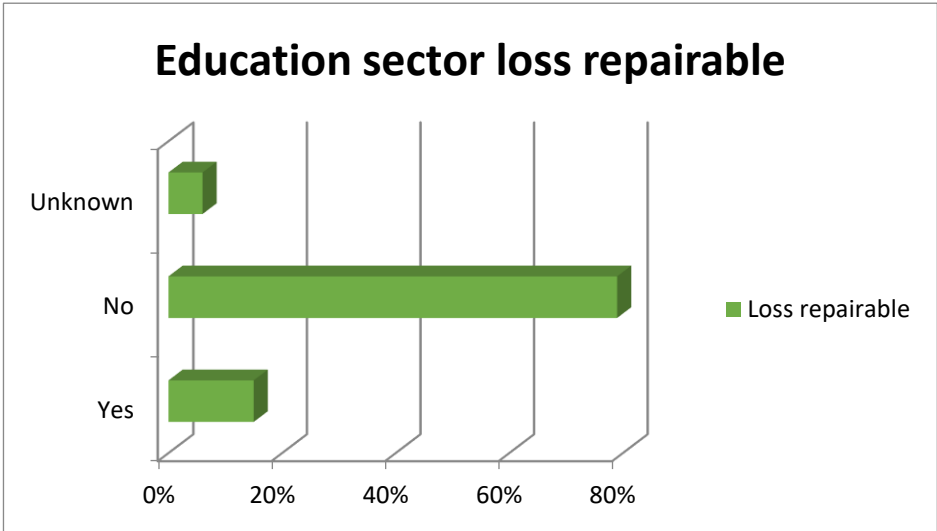
8. Do you support/enjoy DL?



9. Overall, do you think Covid-19 interrupt the education sector?



10. Do you think that this educational interruption is repairable?



Appendix 2: The university website (123 websites) used for determining the number of total higher education students from www.ugc.gov.bd.

Category-wise students	
University Type	Total Students
National University	2788783
Public University	818040
Open University	333615
Private University	361792

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